

# **FINAL YEAR PROJECT**



## **ELECTRONIC TESTING SYSTEM ( ETS )**

**By**

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## ABSTRACT

The final year project is the qualification, which is required to complete the bachelor degree for all final year students of faculty of Computer Science and Information Technology, University Malaya. The purpose of this final year project is to expose students to the real working life of environment as well as getting experience in the real world project management.

In this modern age of Information Technology, people are experiencing with the letter “E” which stands for Electronic. Such as, E-mail, E-commerce, E-government as well as E-test.

The E-test stands for Electronic Testing, is a computer system, that can be applied in any educational institutions for the purpose of examination via computer.

The main objective of this E-Test is to use it for taking the examination on the computer that cannot be done on papers, such as using multimedia or any other interactive knowledge-based questions. ETS has the capacity of generating randomized questions and answers in a large database of access, where students have to experience the E-test during their examination hours.

The ETS is a modern way of testing system, where students have to sit for exam without carrying along with them any traditional testing instruments such as, paper, pen, pencil, and the unique characteristic of this system is to test something that cannot totally be done on papers.

The purpose of developing this ETS is to make easier, secure and time saving testing system, in this modern computer age.

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## 1. INTRODUCTION TO PROJECT

Any system can be designed or modified. It must first be decided what the system is supposed to do. First of all the mission, the objectives and the scope of the project must be identified. Every project must have planning and management, what is called the project planning and the management, which help the developer to accomplish the project in time and without any obstacle.

In our modern world, many activities of our life is being done or is going to be done in the field of our environment. That is why computer systems are needed to be developed according to their needs and wants. Now a days, schools and Universities are solely depended on the computer system. In the modern world, even the examination system, what is called Electronic Testing System (ETS).

The project ETS are developed to be used in any educational institutions for the examination purposes on the computers.

### PROJECT DEFINITION

Electronic Testing System (ETS) is a computer system that is to be used in any educational institutions for taking examination, which totally cannot be done on paper. The ETS have the capacity of generating automatic and randomized questions and answers that is having to be experienced by the students during their examination hours. The development of the ETS could help the teachers in designing questions and answers, which saves the ample of time for them. The ETS is being used or is going to be used in all virtual schools and universities in future.



## INTRODUCTION

### 1. INTRODUCTION TO PROJECT

Before a system can be designed or modified, it must first be decided what the system is supposed to do. First of all the mission, the objectives and the scope of the system must first be identified. Every project must have planning and management, what is called the project planning and the management, which help the developer to accomplish the project in time and without any obstacle.

In this modern computer era, almost every activities of our life is being done or is going to be done through computers in every field of our environment. That is why computer systems are needed to be developed according to their needs and wants. Now a-days, schools and Universities are solely depended on the computers to manage their large databases. In this modern world, even the examination system is being done through computer systems, what is called Electronic Testing System (ETS).

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## 1.4 SCOPE

### 1.2 MOTIVATIONS

Besides the information we collected to develop the system, motivations also necessary for the development of the systems. Positive and appropriate motivations play important rule in the development of the new project. The sources of motivations for this project is as follows:

#### 1.2.1 Multimedia Supper Corridor.

Multimedia Supper Corridor “MSC” is the main sources of motivation that help in developing the ETS. The objective of MSC is to use Computer Technology in every field of our work life, so that every thing will be done easily, fast, and accurate and in secure. The ETS is one of the goals of MSC where computers systems can be used in educational institutions for taking the examination.

### 1.3 OBJECTIVES

Every proposal has certain objectives, without objective a system or proposal cannot be developed. So, after the selection of proposal defining objective is vital important which will help the developer go ahead and enable him or her to accomplish the objectives. The objectives of this project (ETS) is as follows:

1. To exam on computer that cannot totally be done on papers.
2. To generate the questions and answers randomly and automatically.
3. To check the result of the examination instantly and accurately.
4. To save the valuable time of examiners.
5. To implement and get used to the Informational Technology in educational field.



## 1.4 SCOPE

The Electronic Testing System (ETS) is a standalone computer system designed for the purpose of taking examination to be used in any educational institutions. According to the users' requirements, ETS has the following operations.

### 1. Animation based questions

- In this animation based operational question, there is a video animation demonstrating to the examinees in order to answer the questions based on the animations that is displayed to them.

### 2. Audio & listening comprehensive questions

- In this listening comprehensive operations, a conversation is being going on between two persons, concerning certain topics. Students need to listen carefully what was said and finally need to answer the most right answer from the topics discussed.

### 3. Programming language questions

- There are several questions of C/C++ programming language; students are asked questions about the right answers provided as an object type. Students are compulsory to write a C/C++ program according to the questions being asked, to do so, there given the facility of running the "Turbo C/C++" language in order to check the right answer or output given as a form of answers.

### 4. The Internet Access operational questions

- In these operational questions, students are asked questions of Internet skills and they are given the facility of accessing to the Internet in order to check the right answers. For instance, they are asked the URL of certain well-known organizations. They are given opportunity to access Internet by browser in the ETS.

1.5 PROJECT PLANNING

In order to accomplish the selected project in time, a system developer should plan when and how he or she is going to start developing the system within a given period of limited time. In order to carry out his project smoothly, he should design a Gantt chart and a table of system development. The table of system development of ETS is as follows:

1.6 TABLE OF SYSTEM DEVELOPMENT

ACRIVITY	PERIOD	STARTING DATE	FINISHING DATE
<b>Semester I</b>			
Choosing the project	3 days	20 October 1999	23 October 1999
Research & Literature Survey	35 days	25 November 1999	30 December 1999
Information collections	24 days	30 December 1999	24 January 1999
Introduction	10 days	25 January 1999	5 February 1999
First Documentation proposal	20 days	6 February 1999	26 February 1999
<b>Drop. (Semester Break)</b>			
<b>Semester II</b>			
Development	80 days	5 June 2000	25 August 2000
Testing	45 days	26 August 2000	11 September 2000
Implementation and Review	15 days	12 September 2000	18 September 2000
Documentation	120 days	10 February 1999	12 February 2001

Figure 1.1: Stages of System Development

1.5 GANTT CHART

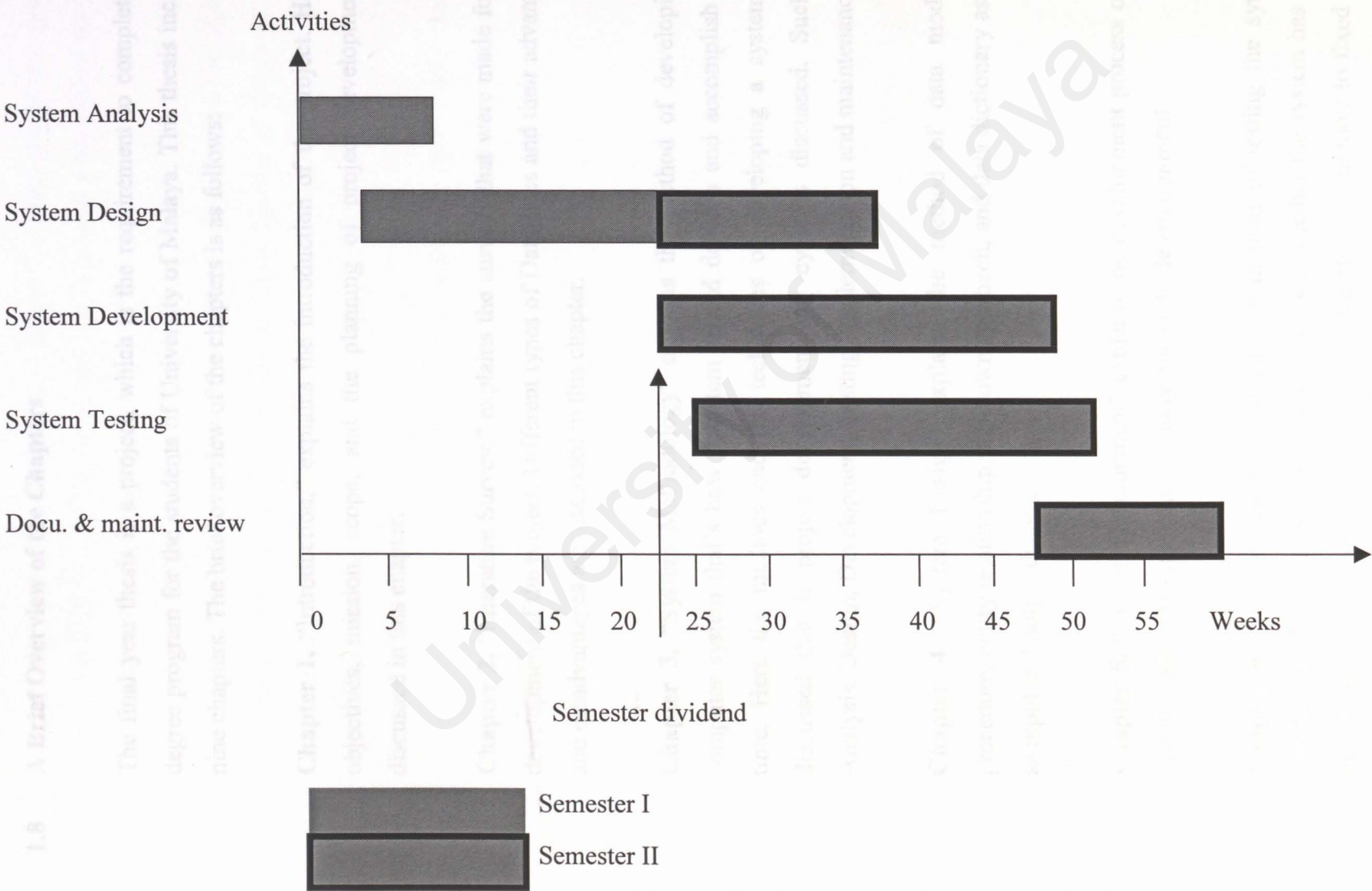


Figure 1.2 : Every phases of the system development



## 1.8 A Brief Overview of the Chapters

The final year thesis is a project, which is the requirement to complete the degree program for the students of University of Malaya. This thesis includes nine chapters. The brief overview of the chapters is as follows:

**Chapter 1**, “Introduction,” explains the introduction of the project. Hence, objectives, mission, scope, and the planning of project development is discussed in this chapter.

**Chapter 2**, “Literature Survey,” explains the surveys that were made for the development of the project. Different types of Databases and their advantages and disadvantages are discussed in this chapter.

**Chapter 3**, “System Methodology” explains the method of developing a computer system that’s how a system should develop and accomplish it in time. Here the methods and the techniques of developing a system are discussed that is project development life cycle is discussed. Such as, Analysis, Design, Development, Testing, Implementation and maintenance.

**Chapter 4**, “System Design” explains the method of data modeling procedure, entity relationship, top-down approach, and data dictionary as well as input and output design.

**Chapter 5**, “System Development” explains the development process of the system, using the supported language and suitable environment.

**Chapter 6**, “System Testing” explains the method of testing the system, whether the designed system is working or not, whether the system has error or not, when the system shows any error, use appropriate tools to fixed or to make error free the system, or employing the expertise to fixed the system.



**Chapter 7, “System Evaluation”** this chapter explains the advantages and value of the ETS, What ETS can do and if ETS is used what kind of service it can provide to the end-users.

**Chapter 8, “Problem faced & Solutions”** This chapter explains the problems that I faced during developing the system, either directly or indirectly, how this kinds of problems could be solved, what are the factor of facing such kinds of problem.

**Chapter 9, “Conclusion”** explains over all activities, performance and the system development process. General idea about the system. Bibliography and about the (CD-ROM) of ETS.

## 2.1 INTRODUCTION

Development of a software system of any size and complexity requires careful planning and research. The development of ETS is no exception. To ensure that the prerequisite knowledge is sufficient, research was conducted in several relevant areas. The following activities are being carried out in order to get the right information for the system that need to be developed.

## 2.2 DEFINITIONS OF ETS

# CHAPTER 2

# LITERATURE SURVEY

### 2.2.1 Types of ETS available

In many educational organizations, we can see there are various types of computer based testing system. One such as ETS (Electronic Testing Service), a kind of Electronic Testing System where the learner or examinee can have the test easily within their vicinity without having to go to a far location where the Test Center is located. An example of ETS is the TOEFL (Test Of English as a Foreign Language) on online computer, which is known as a computer-based TOEFL.

### 2.2.2 The advantages of computer based testing system

There are a lot of advantages of computer based TOEFL. It is convenience and time efficiency for the test takers. If the use of manual paper based system of TOEFL, the test taker need to go to a far location where facilities are provided in order to sit for the test. That will be inconvenience and time consumption.



**LITERATURE SURVEY****2.1 INTRODUCTION**

Development of a software system of any size and complexity requires careful planning and research. The development of ETS is no exception. To ensure that the prerequisite knowledge is sufficient, research was conducted in several relevant areas. The following activities are being carried out in order to get the right information for the system that need to be developed.

**2.2 DEFINITIONS OF ETS**

Electronic Testing System, is a system, testing the learner by using the computer either in a standalone computer or online computer, that is either through Internet or Local Area Network. The main objective of the ETS which exist in most of the organizations throughout the world is to make global communications or to make the examination functions more accessible for learners worldwide.

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Completely changed into a virtual system that is the online teaching and

The advantages of the ETS (Electronic Testing System), it can save the examiners' valuable time. They don't have to take away with them the questions papers as they do in the manual system that is normally done at the Headquarters. This could take few months in order to get the result. But with the development of the computer based TOEFL system, since it is an online system, result can be produced within a short period. The test taker can get the result within few weeks rather having to wait for few months. This makes the modern living become more easily and faster. Nowadays, most business activities are done on the computers, which is globally connected, example *e-commerce*, which is currently the best way of handling business in this modern world. You can notice now, most jobs in Government offices are carried out by means of using computer that is fast, reliable and efficient.

### 2.2.3 The disadvantages of ETS

Earlier on we have discussed mostly on the advantages of ETS, but there are still some disadvantages for an example the *Security System*. Using ETS online which is done via the Internet is open to the public eye, anyone can access to the system. Problems may occur if users misuse and corrupt the system. This people are known as hackers. Hackers are immoral expert people who likes to crack the online system and destroy it or make some sort of virus to destroy the whole system. They create anti-virus for the virus they had created in order to solve the problems that earn them some money. Another disadvantage of ETS is cost effective, which is expensive to maintain and develop the system.

## 2.3 THE BEST OF ETS

The testing process allows student to select on the topic that mainly covers question on multimedia. As we know the best way to remember is to see and listen at the same time. The traditional system of learning and testing, which is paper based, is by reading and memorizing the theories. Nowadays the education system improved dramatically with the advents of the Information Technology. In near future all the educational systems are going to be



Completely changed into a virtual system that is the online teaching and testing system.

The best ETS is the one, which is globally connected. These kinds of ETS are really time saving and they can help many people globally. We can conclude that ETS indeed plays a vital role in this new era.

## 2.4 THE ABILITY OF ETS

The Electronic Testing System (ETS), which is the computer-based system, used in many organizations in various places in the world. But the Electronic Testing System (ETS) which I had developed is a standalone, which is not globally connected and has limited advantages. But it can do a lot of things that covers the interactive and multimedia questions. Also, students are able to answer objective questions that being displayed in the multimedia animations.

With the use of ETS, C/C++ language skills can also be tested on students. Allowing them to access or to run certain programming application during the test time. They are given many questions related to C/C++ languages where they have to write a program by which they are able to choose the right answer, which is provided in the question sections.

Whilst they run the C/C++ applications program, such as Turbo C, they can compile and run the program and get the right output. It also gives them the opportunity of accessing to the Internet, of which student's Internet knowledge can be tested. For an example, students are asked certain URL of well-known organization of which students are able to access Internet in order to get the right answers. Beside C/C++ language and Internet accessing facilities, questions on PowerPoint presentation can also be displayed on slides of which the student have to memorize the number of slides presented.

## **2.5 CONCLUSION**

IT knowledge is catching up with the new technology whereby in the future system like ETS would be a necessity in every organizations. People's life become faster, learning process would be smooth and efficient and learner can learn the actual knowledge in a very short time.

In actual facts, people would be solely grateful to the donations of Science and Technology.



## CHAPTER 3

# SYSTEM METHODOLOGY

**SYSTEM METHODOLOGY****3.0 Introduction**

System development methodology is the process by which a system developer or a system analyst accomplishes the project. Without the skillful planning and controlling a system to be designed will not finished in time. That's why system developers should follow certain procedure that can help them to design the selected proposal.

**3.1 System Requirement for ETS**

To develop any computer system, specific types of hardware and software are required. The hardware and software, which are going to be selected for the development of the project proposal (ETS) must be suitable to the objectives and goals of the system defined earlier. System requirement means both the hardware and the software that are required to run the system. Hardware and software they are interdependent with each another. The hardware developer, when they create any kind of devices or hardware they create specific software for the hardware to be run, what is known as the drivers. The same way when the software developer, design their software applications, they analyze the hardware and system to be used to the specific system to be suitable.

**3.1.1 Hardware Specification**

The Electronic Testing System (ETS) which is going to be designed with the help of specific hardware. To run the software or any applications software, specific or compatible hard is required to run the system smoothly. Since ETS is the multimedia type system which is designed for the purpose of testing. The hardware that needs to run the ETS is given in the Table 3.1.



Hardware Requirement	Minimum	Proposed
Processor (CPU)	486/66 DX	Pentium
RAM	16MB	64MB
Empty HDD Space for Software	10MB	10MB
Empty HDD Space for Data	10MB	100MB
Monitor	VGA	SVGA
Sound Card	Creative	Creative Sound Bla.
Speakers	40 Wat	100 Wat
CD-ROM	20X CD-ROM	52x-CD-ROM
Output Device	Dot Metric Printer	Bubble Jet Printer
Input Device	Mouse & Keyboard	
Hard Disk	1GB	2.1GB
Color Display	16- bit	24 – bit
Operation System	Windows 95	Windows 98

Table 3.1 Hardware Specification

3.1.2 Software Requisition for ETS

Software are essential for the development of any specific system such as Electronic Testing System (ETS). From the survey, what is found to design the ETS is as follows:

3.1.2.1 Operating System

An operating system is a program that acts as an intermediary between a user of a computer and the computer hardware. The purpose of an operating system is to provide an environment in which a user can execute programs in a convenient and efficient manner. The OS provides certain services to programs and to the users of those programs in order to make the programming task easier. There are the system programmers as well as users are using a lot of operating system. They are Windows, DOS, Linux, Unix and so on. Here in our system ETS, we are going the use the following OS.

### 3.1.2.2 Microsoft Windows 98/NT

Windows is an operating system, which is very much user friendly. Windows has different series and version. Such as Windows 3.0 and windows 4.0 (Windows 95) and Windows 98 and so on. It 's very much user friendly and can control a lot of software, from our survey ETS is run under the OS of Windows 98 or Windows NT.

### 3.1.2.3 Microsoft Visual Basic 6.0

Microsoft Visual Basic is the fastest and easiest way to create applications for Microsoft Windows. That is why for the development of Electronic Testing System(ETS) I prefer Visual Basic 6.0.

Visual Basic provides with a complete set of tools to simplify rapid application development. Rather than writing numerous lines of code to describe the appearance and location of interface elements, simply add prebuilt objects into place on screen. For the drawing program such as Paint, it has got necessary skills to create an effective user interface.

The Visual Basic programming language is not unique to Visual Basic. The Visual Basic programming system, Applications Edition included in Microsoft Excel, Microsoft Access, and many other Windows applications uses the same language. The Visual Basic Scripting Edition (VBScript) is a widely used scripting language and a subset of the Visual Basic language. The investment you make in learning Visual Basic will carry over to these other areas.

For creating small utility for individual or work group, a large enterprise-wide system, or even distributed applications spanning the globe via the Internet, Visual Basic has the tools.

- Data access features allow creating databases, front-end applications, and scalable server-side components for most popular database formats, including Microsoft SQL Server and other enterprise-level databases.



- ActiveX™ technologies allow using the functionality provided by other applications, such as Microsoft Word word processor, Microsoft Excel spreadsheet, and other Windows applications. Developer can even automate applications and objects created using the Professional or Enterprise editions of Visual Basic.
- Internet capabilities make it easy to provide access to documents and applications across the Internet or Intranet from within user application, or to create Internet server applications.
- The finished application is a true .exe file that uses a Visual Basic Virtual Machine that can be freely distributed.

There are a lot of application development programs, such as Java, VB6, C++, FoxPro, Dbase, Autoware, Flash and so many. Why I chose the VB6 for the development of ETS is the reason of its OLE functions, which is very much needed for the development of multimedia type database system. Beside that VB6 is the easier programming language that can be learnt in a very short time of period.

#### 3.1.2.4 Microsoft Access 97

Microsoft Access 97 is programming languages as well as a database application. System developer uses MS Access to design their database applications, for the database controlling of ETS Access Database System will be implemented, it is very simple and clear to understand. The MS Access 97-database program is very useful if the selected system to be developed is small, and where there are no redundancies. If the database system is a large system, and need to handle with a great amount of data, Access is not suitable to be used to. That is why for the database management of ETS, Access 97 is being used.



### 3.1.2.5 Microsoft Word 97

Microsoft Word 97 is the word processor applications used for the purposes of documentation and as well as for others. MS Word 97 is the most useable and favorite word processor to the modern people. It is one of the components of Microsoft Office 97. The latest version of MS word processor is the MS Office 2000, which has the most powerful tools to design any kind of jobs. It is used for the development of ETS specifically for the documentation of ETS.

### 3.1.2.6 Microsoft PowerPoint 97

Microsoft PowerPoint is a Microsoft Office component application, which is used most in the presentation purposes. It is used in various organizations, educational institutions, seminars, for presenting their documentation or teaching in a interactive way. ETS use the PowerPoint to designing interactive questions for the students.

### 3.1.2.7 Microsoft Internet Explorer 5x

Microsoft Internet Explorer is the Microsoft Windows component, which is known as a browser. It mainly used for accessing the Internet. There are various types of MS IE in various versions. Such as, Netscape Navigator, Opera and so on. The most easily available browser is the IE. IE now a-days play the very important rules in the Information Technology era, since accessing to Internet is a must to everybody for various reasons.

IE technology is also used in the ETS, for designing the questions. As we designed the questions of Internet skills, we need to use the browser in order to access to Internet.

### 3.1.2.8 Turbo C/C++

Turbo C/C++ is the programming language known as the C language, which is known as the intermediate level language. It is a very useful language and applicable almost to every environment and since it is not highly graphic programming, the performance is very fast.

We use this Turbo C/C++ program in order to design questions for ETS. Students are asked to write program using the Turbo C/C++ , and they are given opportunity to access the Turbo C/C++ program.

## 4. Development Strategy

The types of development tools, such as either prototyping or System Development Life Cycle (SDLC).

### 4.1 Prototyping

System developer in developing their system is using Prototyping such as waterfall methodology. Prototyping is a sub-process that could help to control trashing during software development process and also help to enhance understanding of the process.

Prototyping is a partially developed product that enables users and developers to examine if it is suitable or appropriate for the finished product. For example, developer may build a system to implement a small portion of some key requirements to ensure that the requirements are consistent, favorable and practical; if not, revisions are made at the requirement stage, rather than at the most costly testing stage. Similarly, parts of design may be done by prototyping, as shown in figure 3.1.

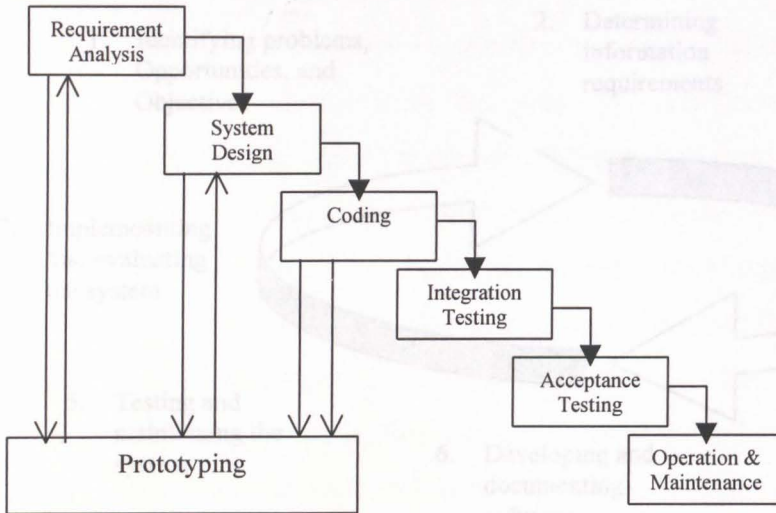


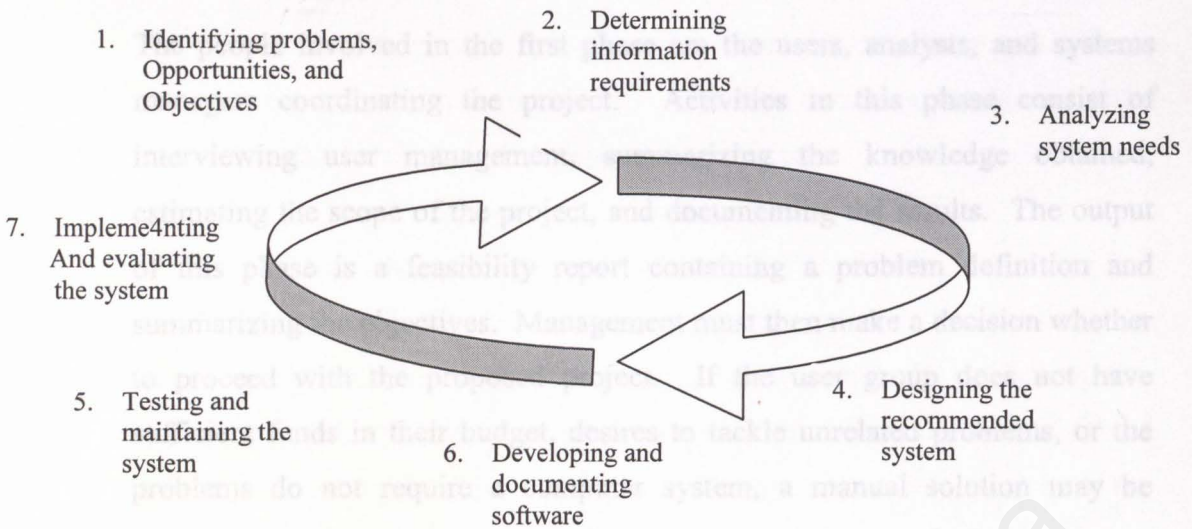
Fig: 3.2 the waterfall model with prototyping.

#### 4.2. System Development Life Cycle

One of the best methodology that system developer use as the systematic approach to the analysis and design the information system. Much of this is embodied in what is called the *systems development life cycle* (SDLC). For the development and designing ETS, SDLC is much appropriate. The SDLC is a phased approach to analysis and design, which holds that systems are best, developed through the use of a specific cycle of analyst and user activities.

Analysts disagree on exactly how many phases there are in the systems development life cycle but generally laud its organized approach. Here we have divided the cycle into seven phases, as shown in Figure 1.2. Although each phase is presented discretely, it is never accomplished as a separate step. Instead, several activities can occur simultaneously, and activities may be repeated. That is why it is more useful to think of the SDLC as accomplished in phases (with activities in full swing overlapping with others, and then tapering off) and not in separate steps.





#### 4.2.1 Identifying Problems, Opportunities and Objectives

In this first phase of the systems development life cycle, the analyst is concerned with identifying problems, opportunities, and objectives. This stage is critical to the success of the rest of the project, since no one wants to waste subsequent time addressing the wrong problem.

The first phase requires that the analyst look honestly at what is occurring in a business. Then, together with other organizational members, the analyst pinpoints problems. Often, others will bring these up, and they are the reason the analyst was initially called in.

Opportunities are situations that the analyst believes can be improved through the use of computerized information systems. Seizing opportunities may allow the business to gain a competitive edge or set an industry standard.

Identifying objectives is also an important component of the first phase. First, the analyst must discover what the business is trying to do. Then the analyst will be able to see if some aspect of information systems applications can help the business reach its objectives by addressing specific problems or opportunities.

The people involved in the first phase are the users, analysts, and systems managers coordinating the project. Activities in this phase consist of interviewing user management, summarizing the knowledge obtained, estimating the scope of the project, and documenting the results. The output of this phase is a feasibility report containing a problem definition and summarizing the objectives. Management must then make a decision whether to proceed with the proposed project. If the user group does not have sufficient funds in their budget, desires to tackle unrelated problems, or the problems do not require a computer system, a manual solution may be recommended, and the systems project does not proceed any further.

#### 4.2.2 Determining Information Requirements

The next phase that the analyst enters is that of determining information requirements for the particular users involved. Among the tools used to define information requirements in the business are: sampling and investigating hard data, interviewing, questionnaires, observing decision makers' behavior and office environments, and even prototyping.

In this phase, the analyst is striving to understand what information users need to perform their jobs. You can see that several of the methods for determining information requirements involve interacting directly with users. This phase serves to fill in the picture that the analyst has of the organization and its objectives. Sometimes only the first two phases of the systems development life cycle are completed. This kind of study may have a different purpose and is typically carried out by a specialist called an information analyst (IA).

The people involved in this phase are the analysts and users, typically operations managers and operations workers. The systems analyst needs to know the details of current system functions: who (the people who are involved), what (the business activity) where (the environment in which the work takes place), when (the timing), and how (how the current procedures are performed) of the business under study.



The analyst must then ask why the business uses the current system. There may be good reasons for doing business using the current methods, and these should be considered when designing any new system.

However, if the reason for current operations is “It’s always been done that way,” the analyst may wish to improve on the procedures. Business process reengineering may be of help in framing an approach for rethinking the business in a creative way. At the completion of this phase, the analyst should understand how the business functions and has complete information on the people, goals, data, and procedures involved.

#### 4.2.3 The Technique of collecting information for ETS

For our Electronic Testing System, we collected information, form the following sources:

- Visiting web sites that are related to our system, such as Internet.
- Interviewing the institutions, for the collection of data.
- Reading related books, which are mentioned in the bibliography.
- Making Survey from the existing, related to ETS.

#### 4.2.4 Analyzing System Needs

The next phase that the systems analyst undertakes involves analyzing system needs. Again, special tools and techniques help the analyst make requirements determinations. One such tool is the use of data flow diagrams to chart the input, processes, and output of the business’s functions in a structured graphical form. From the data flow diagrams, a data dictionary is developed that lists all of the data items used in the system, as well as their specifications—whether they are alphanumeric and how much space they take up when printed.



During this phase the systems analyst also analyzes the structured decisions made. Structured decisions are those for which the conditions, condition alternatives, actions, and action rule can be determined. There are three major methods for analysis of structured decision: structured English, decision tables, and decision trees.

Not all decisions in organizations are structured, but it is still important for the systems analyst to understand them. Semistructured decisions (decisions made under risk) are often supported by decision support systems. When analyzing semistructured decisions, the analyst examines the decisions based on the degree of decision-making skill required, the degree of problem complexity, and the number of criteria considered when the decision is made.

Analysis of multiple-criteria decisions (decisions where many factors must be balanced) is also part of this phase. Many techniques are available for analyzing multiple-criteria decisions, including the tradeoff process and the use of weighting methods.

At this point in the systems development life cycle, the systems analyst prepares a systems proposal that summarizes what has been found, provides cost/benefit analyses of alternatives, and make recommendations is acceptable to management, the analyst proceeds along that course. Each systems problem is unique, and there is never just one correct solution. The manner in which a recommendation or solution is formulated depends on the individual qualities and professional training of each analyst.

#### 4.2.5 Designing the Recommended System

In this phase of the systems development life cycle, the systems analyst uses the information collected earlier to accomplish the logical design of the information system. The analyst designs accurate data-entry procedures so that data going into the information system are correct.

In addition, the analyst also provides for effective input to the information system by using techniques of good form and screen design.

Part of the logical design of the information system is devising the user interface. The interface connects the user with the system and is thus extremely important. Examples of user interfaces include a keyboard to type in questions and answers, on-screen menus to elicit user commands, and a mouse to select options.

The design phase also includes designing files or databases that will store much of the data needed by decision-makers in the organization. An well-organized database is the basis for all information systems. In this phase the analyst also works with users to design output either on the screen or printed that meets their information needs.

Lastly, the analyst must design controls and backup procedures to protect the system and the data and produce program specification packets for programmers. Each packet should contain input and output layouts file specifications, and processing details, and it may also include decision trees or tables, data flow diagrams, a system flowchart, and the names and functions of any pre-written code routines.

#### 4.2.6 Developing and Documenting Software

In fifth phase of the system development life cycle, the analyst works with programmers to develop any original software that is needed. Some of the structured techniques for designing and documenting software include a structured chart, the HIPO method, flowcharts, Nassi-Shneiderman chart, Warnier-Orr diagrams, and pseudocode. The system analyst uses one or more of these devices to communicate to the programmer what needs to be programmed.



During this phase, the analyst also works with users to develop effective documentation for software including procedure manuals documentation tells users how to use software and also what to do if software problems occur.

Programmers have a key role in this phase as they design, code, and remove syntactical errors from computer programs. If the program is to run in a mainframe environment, job control language (JCL) must be created. To ensure quality, a programmer may conduct either a design or a code walkthrough, explaining complex portions of the program to a team of other programmers.

#### 4.2.7 Testing and maintaining the System

Before the information system can be used, it must be tested. It is much less costly to catch problems before the system is signed over to users. Some of the testing is completed by programmers alone, some of it by systems analysts in conjunction with programmers. A series of tests to pinpoint problems is run first with sample data and eventually with actual data from the current system.

Maintenance of the system and its documentation begins in this phase and is carried out routinely throughout the life of the information system. Much of the programmer's routine work consists of maintenance, and businesses spend a great deal of money on maintenance. Many of the systematic procedures the analyst employs throughout the systems development life cycle can help ensure that maintenance is kept to a minimum.

#### 4.2.8 Implementing and evaluating the System

In this last phase of system development, the analyst house implements the information system. This involves training users to handle the system. Vendors do some training, but oversight of training is the responsibility of the system's analyst. Additionally, the analyst needs to plan for a smooth conversion from the old system to the new one.



This process includes converting files from old formats to new ones or building a database, installing equipment, and bringing the new system in to production.

Evaluation is shown as part of this final phase of the systems development life cycle mostly for the sake of discussion. Actually, an evaluation takes place during every phase. A key criterion that must be satisfied is whether the intended users are indeed using the system.

It should be noted that systems work is often cyclical. When an analyst finishes one phase of system development and proceeds to the next, the discovery of a problem may cause the analyst to return to the previous phase and modified the work done there. For example, during the testing phase, the programmer may discover that the program does not work correctly, either because code was not written to support certain portions of the system design or the design was incomplete. In either event the programs must be modified, and the analyst may have to change some of the system design materials. In turn, this may necessitate that the analyst meet with the users and reinvestigate how a specific business activity functions.

### **4.3 CONCLUSION**

In the designing of computer system, methodology plays a very important role without which the best system cannot be developed in time. Besides the methodology, appropriate hardware and software are also need to take into account. In the development of a system, such as ETS, many hardware and software are needed. The main programming language, used in the development of ETS is VB6 and Access 97 for the database. The methodology that is easier and clear is the SDLC, which is used in ETS.

## 4.1 System Design

In the final phase of the systems development life cycle, the systems analyst uses the information collected earlier to accomplish the logical design of the information system. The analyst designs accurate data entry procedures so that data going into the information system are correct. In addition, the analyst also provides for effective input to the information system by using techniques of good form and screen design.

# **CHAPTER 4**

# **SYSTEM DESIGN**

Finally, the analyst must design controls and backup procedures to protect the system and the data and produce program specification packets for programmers.

### Database Design

Data storage is considered by some to be the heart of an information system. The database design starts with the end users' views of the organization called the conceptual requirements. An end user is a decision-maker that uses information obtained by accessing the database. The end users also provide data to be stored in the database. In the case of EIS, the end users are the individuals who are asking for the EIS.

In considering the end users' requirements, the following trade-offs have to be taken into account:



## SYSTEM DESIGN

### 4.1 System Design

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In considering the end users' requirements, the following trade-offs have to be taken into account:

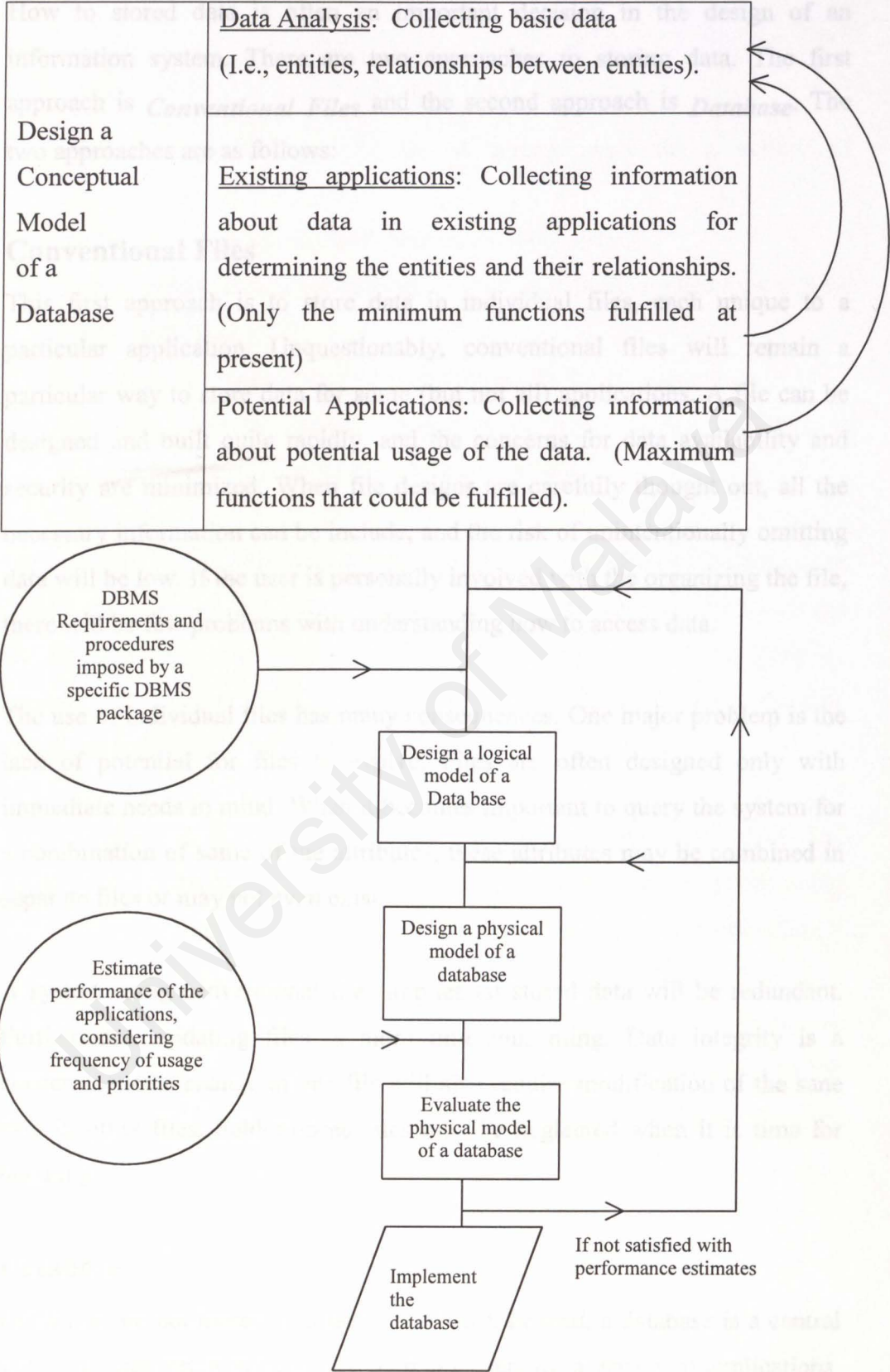


Figure 4.1 Data base design steps



How to stored data is often an important decision in the design of an information system. There are two approaches to storing data. The first approach is **Conventional Files** and the second approach is **Database**. The two approaches are as follows:

#### 4.2.1 Conventional Files

This first approach is to store data in individual files, each unique to a particular application. Unquestionably, conventional files will remain a particular way to store data for some (but not all) applications. A file can be designed and built quite rapidly, and the concerns for data availability and security are minimized. When file designs are carefully thought out, all the necessary information can be include, and the risk of unintentionally omitting data will be low. If the user is personally involved with the organizing the file, there will be few problems with understanding how to access data.

The use of individual files has many consequences. One major problem is the lack of potential for files to evolve. Files are often designed only with immediate needs in mind. When it becomes important to query the system for a combination of some of the attributes, these attributes may be combined in separate files or may not even exist.

A system using conventional files implies tat stored data will be redundant. Furthermore, updating files is more time-consuming. Data integrity is a concern, since a change in one file will also require modification of the sane data in other files. Seldom-used files may be neglected when it is time for updating.

#### 4.2.2 Database

Databases are not merely a collection of files. Instead, a database is a central source of data meant to be shared by many users for a variety of applications. The heart of a database is the DBMS (Database Management System), which allows the creation. Modification and updating of the database; the retrieval of data; and the generation of reports.

The effectiveness objectives of the database includes:

1. Ensuring that data can be shared among users for a variety of applications.
2. Maintaining data that are both accurate and consistent.
3. Ensuring that all data required for current and future applications will be readily available.
4. Allowing the database to evolve and the needs for the users grow.
5. Allowing users to construct their personal view of the data without concern for the way the data re physically stored.

The foregoing list of objectives provides us with a reminder of the advantages and disadvantage of the database approach. First, the sharing of data means that data need to be shared only once. This in turn helps achieve data integrity, since changes to data are accomplished more easily and reliable if the data appear once rather than in many differences.

Database approach is a concept that is becoming increasingly important. The use of relational databases on network PCs means that the concept is becoming understandable to many users. Many users are extracting parts of the central database from main frames and downloading them onto their personal computers. This similar database are then used to generate reports or answer queries specific to the end user. One major technological change has been the design of database software to take advantage of the graphical user interface (GUI).

#### 4.2.2.1 Data Concepts

Before considering the use of conventional Files of database approach, it is important to understand how data are represented. The following diagram shows the Reality, data and metadata.



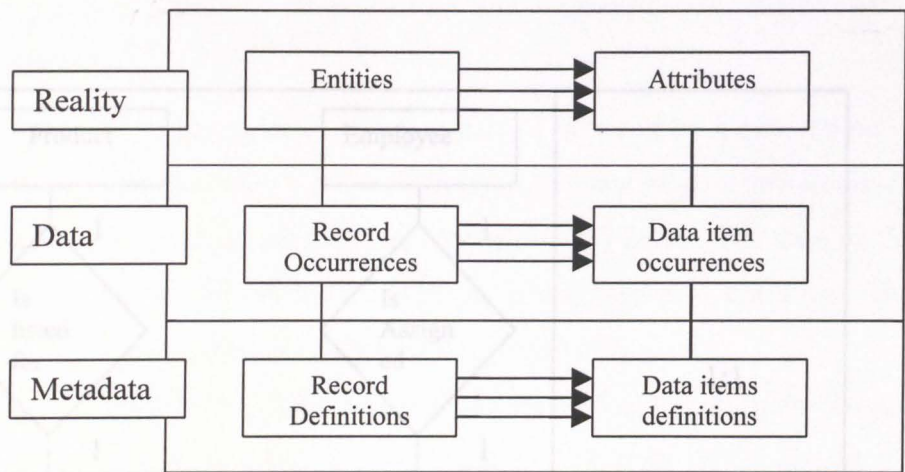


Figure 4.2 Reality, data & metadata

**Reality, Data, Metadata**

The real world itself will be referred to as reality; data collected about people, place, or events in reality will eventually be stored in the file of database. In order to understand the form and structure of the data, information about the data itself is required. The information that describes data is referred to as metadata.

The relationship between reality, data and metadata is pictured in figure 4.2. Within the realm of reality, there are entities and attributes; within the realm of actual data, record occurrences and data item occurrence; within the realm of metadata, there are record definitions and data item definitions. The meanings of these items are discussed in the following:

**4.2.2.1.1 Entity**

Any object or event about which someone chooses to collect data is an entity. An entity may be a person, place or thing—for example, a student, faculty, a city or a product. Any entity can also an event or unit of time such as a machine breakdown, a sale or a month or year.

**4.2.2.1.2 Relationships**

Relationships are associations between entities (some time they are referred to as data association). Below is the Entity-Relationship (E-R) Diagram.

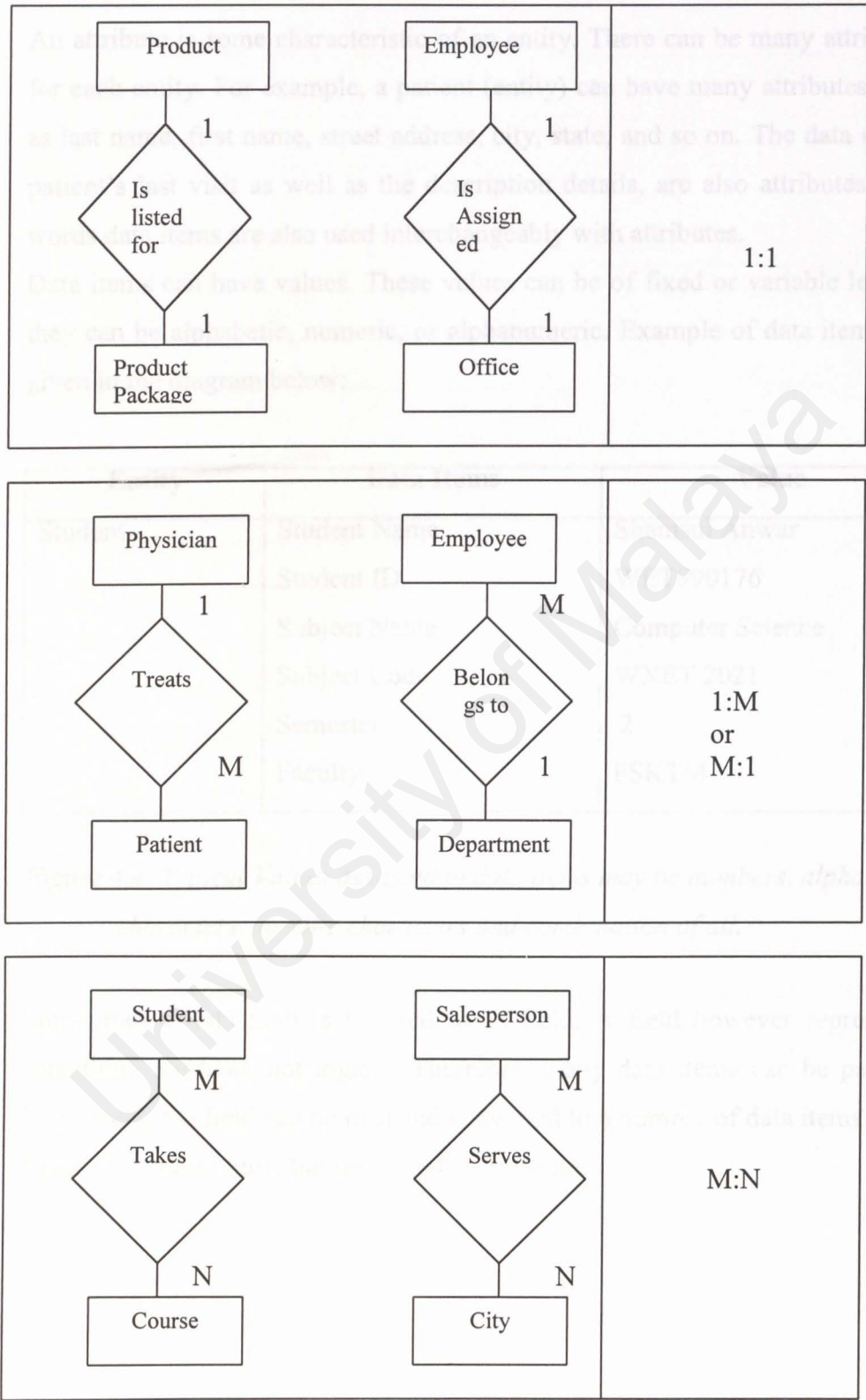


Figure 4.3 Entity Relationship Diagrams; can show one-to-one, one-to-many, many-to-one, or many-to-many.



4.2.2.1.3 Attributes

An attribute is some characteristic of an entity. There can be many attributes for each entity. For example, a patient (entity) can have many attributes such as last name, first name, street address, city, state, and so on. The data of the patient’s last visit as well as the description details, are also attributes. The words data items are also used interchangeably with attributes.

Data items can have values. These values can be of fixed or variable length; they can be alphabetic, numeric, or alphanumeric. Example of data items are given in the diagram below:

Entity	Data Items	Value
Student	Student Name	Shamsul Anwar
	Student ID	WET990176
	Subject Name	Computer Science
	Subject Code	WXET 2021
	Semester	2
	Faculty	FSKTM

Figure 4.4. Typical Values assigned to data items may be numbers, alphabetic characters, specific characters and combination of all.

Sometimes a data item is referred to as field. A field however represents something physical, not logical. Therefore, many data items can be packed into a field; the field can be read and converted to a number of data items. The figure 4.5, below show the fields and its attributes.

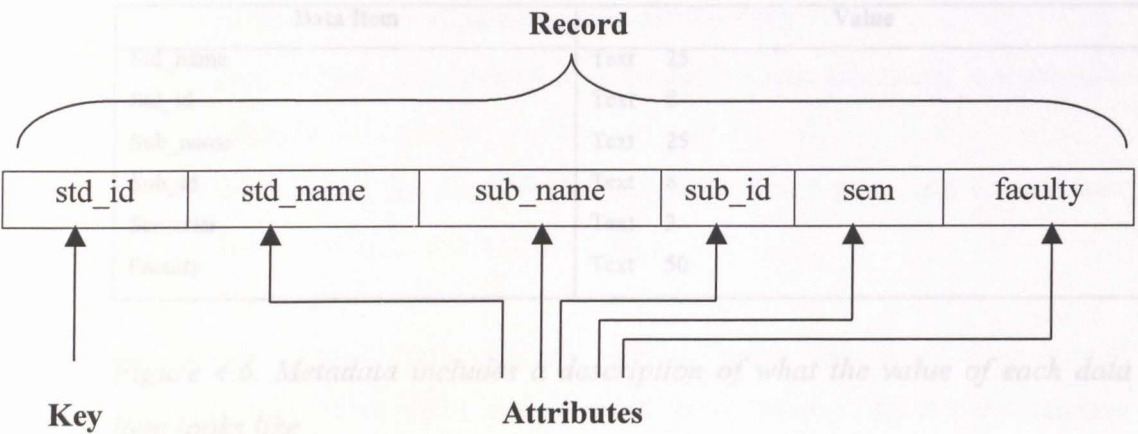


Figure 4.5. A record has a primary key and may have many attributes.

Records

A record is a collection of data items that have something in common with the entity described. The above figure is the illustration of a record with many related data items. The record shown is for a student’s database to keep the student’s records in ETS. Here, `std_name`, `std_id`, `sub_name`, `sub_id`, **semester** and **faculty** are all attributes. Most records are fixed length, so there is no need to determine the length of the record each time.

Keys

A key is one of the data items in record that is used to identify a record. When a key uniquely identifies a record, it is call *a primary key*. For example, `std_id`, can be *primary key* because only one number is assigned to each student.

When it is not possible to identify a record uniquely by using one of the data items found in record, a key can be constructed by choosing two or more data items and combining them. This is called a concatenated key.

Metadata

Metadata is data about the data in the file or database. Metadata describes the name given and the length assigned each data item. Metadata also describes the length and compositions of each of the records. Figure 4.6 below is an example of metadata for database. Figure 4.6 shows the Metadata of ETS.



Data Item	Value
Std_name	Text 25
Std_id	Text 8
Sub_name	Text 25
Sub_id	Text 8
Semester	Text 3
Faculty	Text 50

Figure 4.6. Metadata includes a description of what the value of each data item looks like.

4.2.2.1.4 The Data Dictionary

The data dictionary is a specialized application of the kinds of dictionaries used as references in everyday life. The data dictionary is a reference work of data about data (that is, metadat) compiled by system analysts to guide them through analysis and design. As a document, the data dictionary collects, coordinates, and confirms what a specific data term means to different people in the organization. It is a central repository of information about the entities: the data elements representing the entities, the relationships between the entities, their origins, meanings, use, and representation formats.

In any enterprise, installation of a database does not happen overnight. The database expands as applications are developed and integrated. New data elements are introduced, and data elements used for the data base design may have to be modified. A facility that provides uniform and central information about all the data resources is called a “data dictionary” (DD).

The benefits of using a data dictionary are related to the effective collection, specification, and management of the total data resources of an enterprise. A data dictionary should help a data base user in:

- Communicating with the other users.
- Controlling the data elements in a simple and effective manner, that is, introducing new elements into the systems, or changing the descriptions of the elements.

- Reducing data redundancy and inconsistency.
- Determining the impact of changes to data elements on the total database.
- Centralizing the control of the data elements as an aid in data base design and in expanding the design.

In addition, an ideal data dictionary contains information about other entities. It stores information about the groups of data elements, about the databases, and about the cross-references between the groups of data elements and the databases. It also indicates which programs use which databases, and it keeps information regarding the authorization and the security codes.

#### 4.2.3 Data Dictionary and Its Interfaces

We will consider a data dictionary's interfaces in an environment with a single data base management system, as in Figure 4.7.

In the beginning stage of the database designing process, the data base administration function will be interacting with the data dictionary. With the help of a report generator (which probably is an integral part of the data dictionary package), the management and the users will be provided with reports tailored to the individual user's needs.

The reports may contain information regarding the following:

- The data elements and the entities
- The relationships between the data elements and between the entities.
- Responsibilities of the users for correctness of the data
- Frequency of usage and textual descriptions of the data elements
- Access control information
- Audit reports
- Predefined summary reports
- User defined ad hoc reports
- Cross-reference reports
- Change reports



- Error reports

A data dictionary may also generate data descriptions for high level languages in the form of appropriate language dialects to the program libraries and to the compilers. Information about cross-reference relationships between the data elements and application programs can be stored in the data dictionary.

The DBMS directories are readable by the data dictionary system in order to provide data on the current state of the DBMS. The data types in the database should be updated after the data dictionary system makes note of the changes, and the data should be updated only when it is found acceptable to the DBMS.

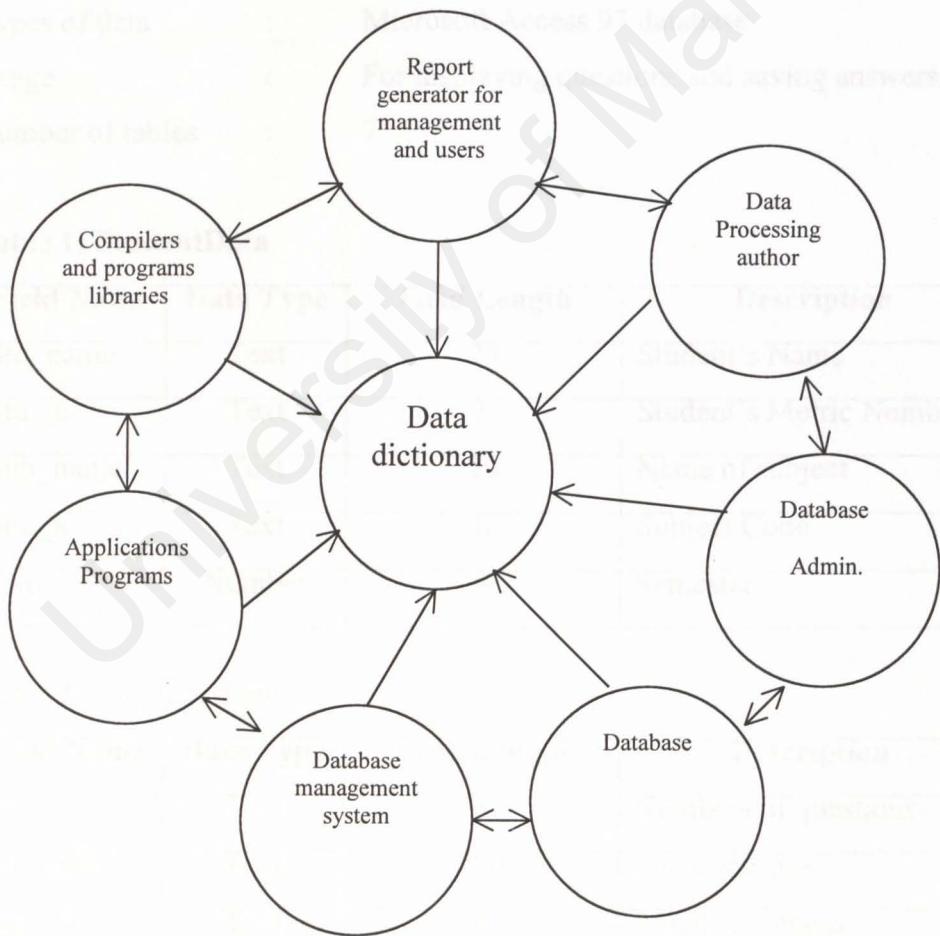


Figure 4.7 Data Dictionary's Interfaces in an ideal database environment.  
There are two types of interfaces:

- 1. The interface with the people involved, for example, database administrator, system programmer, system analyst, application programmer, management, end user, and auditor.
- 2. The interface with the software, for example, database management system, compilers, operating system, and report generators

4.2.4 Data Dictionary of ETS

Data dictionary is very important for the future enhancement of the system as explained in previous paragraph. The database name of ETS is as follows:

Name of database file :	D:/Etest/Ets.mdb
Name of source data :	Ets.mdb
Types of data :	Microsoft Access 97 database
Usage :	For displaying questions and saving answers.
Number of tables :	7

Table 1: StudentData

Field Name	Data Type	Field Length	Description
Std_name	Text	25	Student's Name
Std_id	Text	8	Student's Metric Number
Sub_name	Text	50	Name of subject
Sub_id	Text	8	Subject Code
Sem	Number	3	Semester

Table 2: avi\_questions

Field Name	Data Type	Field Length	Description
qst_id	Text	5	Numbers of questions
qst_name	Text	200	The questions
Answer1	Text	50	Possible Answer
Answer2	Text	50	Possible Answer
Answer3	Text	50	Possible Answer
Answer4	Text	50	Possible Answer
true	Text	50	The right answer



Table 3: c\_questions

Field Name	Data Type	Field Length	Description
qst_id	Text	5	Numbers of questions
qstc_name	Text	200	The questions
Answer1	Text	50	Possible Answer
Answer2	Text	50	Possible Answer
Answer3	Text	50	Possible Answer
Answer4	Text	50	Possible Answer
true	Text	50	The right answer

Table 4: i\_questions

Field Name	Data Type	Field Length	Description
qst_id	Text	5	Numbers of questions
qst_name	Text	200	The questions
Answer1	Text	50	Possible Answer
Answer2	Text	50	Possible Answer
Answer3	Number	50	Possible Answer
Answer4	Text	50	Possible Answer
true	Text	50	The right answer

Table 5: pnt\_questions

Field Name	Data Type	Field Length	Description
qst_id	Text	5	Numbers of questions
qst_name	Text	200	The questions
Answer1	Text	50	Possible Answer
Answer2	Text	50	Possible Answer
Answer3	Number	50	Possible Answer
Answer4	Text	50	Possible Answer
true	Text	50	The right answer

Table 6: answers

Field Name	Data Type	Field Length	Description
std_id	Text	8	Students' Metric Numbers
qst_no	Text	5	Numbers of questions
Answer	Text	50	Selected answer
True	Text	50	Right answer- true/false

Table 7: Users

Field Name	Data Type	Field Length	Description
USER_NAME	Text	25	Authorizers' name
PASSWORD	Text	8	Authorizers' password

4.3 Normalization

Normalization is the transformation of complex user views and data stores to a set of smaller, stable data structures. In addition to being simpler and more stable, normalized data structures are more easily maintained.

Electronic Testing System (ETS) is a standalone computer system based system. It is also important to focus on the redundancy and data consistency. The tables or the relations that are going to be use in the Electronic Testing is given bellow as a non-normalized form. Since is it not normalized, there will be redundant of the database of ETS. To eliminate the redundancy, the Normalization technique should be used.

Std_name	std_id	sub_name	Sub_id	Sem	faculty	qst_id	qst_name	answer	True
----------	--------	----------	--------	-----	---------	--------	----------	--------	------

4.3.1 The three types of normalization

Beginning with either a user view or a data store developed for a data dictionary, the analyst normalized a data structure in three steps. Each step involves an important procedure to simplify the data structure.



Database used in ETS

4.3.1.1 First Normal Form(1NF)

The first step in normalizing a relation is to remove the repeating groups. In our ETS relations, the first relation that was given above has a lot of repeating groups. We have to remove the repeating groups.

4.3.1.2 Second Normal Form(2NF)

In the second normal form, all of the attributes will be functionally dependent on the primary key. Therefore, the next step is to remove all of the partially dependent attributes and place them in another relation.

4.3.1.3 Third Normal Form(3NF)

A normalized relation is third normal form if all of the donkey attributes are functionally dependent on the primary key and there are no transitive (nonkey) dependencies. This is how our Non-normalized relation is normalized until the third normal form.

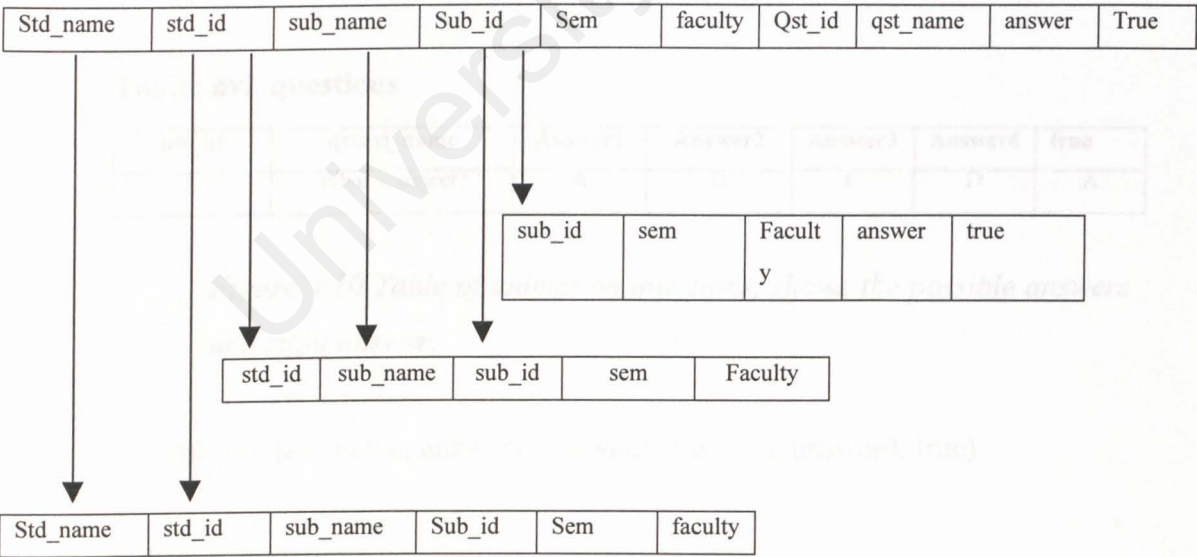


Figure 4.8. The diagram above shows the relations when are normalized until third normal form.

4.4 Database used in ETS

Database is main store of most of the systems. Database plays very important role in managing the information of the system. Access database is being used in the development of ETS. This is because, Access database is easy to lean and can be used in the development of any system within a sort period of time. The Access database file that is used in ETS is, ets.mdb, and the related tables that are used are as follows:

- 1. (std\_id, std\_name, sub\_name, sub\_id, semester, faculty)

Table: StudentData

std_id	std_name	sub_name	sub_id	sem	faculty
WET990176	Shamsul Anwar	Computer Science	WXET 2102	2	FSKTM

Figure 4.9 Student’s personal information table

- 2. (qst\_id, qstavi\_name, answer1, answer2, answer3, answer4, true)

Table: avi\_questions

qst_id	qstavi_name	Answer1	Answer2	Answer3	Answer4	true
1	What is object?	A	B	C	D	A

Figure 4.10 Table of animation questions, shows the possible answers and right answer.

- 3. (qst\_id, qstc\_name, answer1, answer2, answer3, answer4, true)

Table: c\_questions

qst_id	qstc_name	Answer1	Answer2	Answer3	Answer4	true
1	What is C/C++?	A	B	C	D	B

Figure 4.10 Table of C/C++ language questions, shows the possible answers and right answer.



4. (qst\_id, qsti\_name, answer1, answer2, answer3, answer4, true)

Table: i\_questions

qst_id	qsti_name	Answer1	Answer2	Answer3	Answer4	true
1	What is Internet?	A	B	C	D	C

Figure 4.10 Table of Internet questions, shows the possible answers and right answer.

5. (qst\_id, qstp\_name, answer1, answer2, answer3, answer4, true)

Table: pnt\_questions

qst_id	qstp_name	Answer1	Answer2	Answer3	Answer4	true
1	What is Slide?	A	B	C	D	D

Figure 4.10 Table of PowerPoint questions, shows the possible answers and right answer.

4.5 Structure Design

In order to be a system user friendly, output and input screen must be very efficient, easy and understandable to the end users. The main structure of ETS is, the authorized user must access the system with the valid authorization, such user name and user password.

4.6 Input & Output Design

Input and output designing of a system is very important in order to be easier for the end user. The more clear and friendly input and output of a system, is the more acceptable by the viewers or the end users. In order to design the input output screen of ETS. We are going to use the Visual Basic designing tools. And for the purpose of the Database, we are going to use the Microsoft Access 97, database technology.

Input Screen for the authorized users:

USER AUTHORIZATION			
User name:	User1		
User ID:	User1		
OK	Cancel	Change password	

Figure 4.11 The authorizations input

The main Input Screen, for students to be filled in:

ETS

ELECTRONIC TESTING SYSTEM

Read the following information.

- Read the instructions.
- Fill in the particulars.
- Press next.

< Enter your particulars >

Full name

 : 

Shamsul Anwar

Metric No

 : 

WET990176

Subject name

 : 

Com. Science

Subject code

 : 

WXET 2102

Semester

 : 

2

Faculty

 : 

FSKTM

Information

Next

Figure 12. The main input screen for the students. Students must fill this in order to enter inside the questions sections.



#### **4.7 CONCLUSION**

System designing is the main step in designing the selected system. System analyst arranges his idea or dreams of developing a system in to a systematically organized way, so that in the developing stage the activities would be easily done.

*CHAPTER 5*  
*SYSTEM*  
*DEVELOPMENT*

University of Malaya

## CHAPTER 5

# SYSTEM DEVELOPMENT



## SYSTEM DEVELOPMENT

### 5.1 DEFINITION

The constructions of the new system and the delivery of that system into “production”. In this developing steps where system is going to be developed according to the system’s (ETS’s) objectives.

There is a lot of programming languages (software) for developing system. But in the development of ETS, Visual Basic 6.0 is being used due to its new features that supports the multimedia object.

### 5.2 PROGRAMMING LANGUAGES

A computer is an incredibly stupid device. It doesn't do anything unless and until it is told to do so. When a computer is first switched on, the CPU starts looking through main memory for an instruction. You can think of it as being in a perpetual state of readiness.

The CPU expects instructions to arrive as numeric codes. These numeric codes are not easily read by human beings. A *programming language* is a set of English-like instructions that includes a set of rules (syntax) for putting the instructions together to create commands.

### 5.3 TYPES OF PROGRAMMING LANGUAGES

The types of programming languages that are used IN ETS is MS VB6 and MS Access 97, because of its new and advance features:

### 5.4 MICROSOFT VISUAL BASIC 6.0

The Visual Basic language is quite powerful, the fastest and easiest way to create applications for Microsoft Windows. Visual Basic provides a system developer with a complete set of tools to simplify rapid application development. So what is Visual Basic? The "Visual" part refers to the method used to create the graphical user interface (GUI). Rather than writing

numerous lines of code to describe the appearance and location of interface elements, simply can be added rebuilt objects into place on screen.

The "Basic" part refers to the BASIC (Beginners All-Purpose Symbolic Instruction Code) language, a language used by more programmers than any other language in the history of computing. Visual Basic has evolved from the original BASIC language and now contains several hundred statements, functions, and keywords, many of which relate directly to the Windows GUI. Beginners can create useful applications by learning just a few of the keywords, yet the power of the language allows professionals to accomplish anything that can be accomplished using any other Windows programming language.

The Visual Basic programming language is not unique to Visual Basic. The Visual Basic programming system, Applications Edition included in Microsoft Excel, Microsoft Access, and many other Windows applications uses the same language. The Visual Basic Scripting Edition (VBScript) is a widely used scripting language and a subset of the Visual Basic language.

Whether to create a small utility for individual or for work group, a large enterprise-wide system, or even distributed applications spanning the globe via the Internet, Visual Basic has the tools to be needed.

- Data access features allow creating databases, front-end applications, and scalable server-side components for most popular database formats, including Microsoft SQL Server and other enterprise-level database.
- ActiveX technologies allow using the functionality provided by other applications, such as Microsoft Word processor, Microsoft Excel spreadsheet, and other Windows applications. It can even automate applications and objects created using the Professional or Enterprise editions of Visual Basic.



- Internet capabilities make it easy to provide access to documents and applications across the Internet or Intranet from within the application, or to create Internet server application.
- The finished application is a true .exe file that uses a Visual Basic Virtual Machine that can be freely distributed.

Visual Basic Database

The Data Access documentation discusses data access and connects to information on related tools and technologies. It is divided into three parts. The first part covers tools and technology options. The second part presents tutorials that give information of "scenarios" which employ the tools and technologies in real-world situations. The third part presents information on two older Visual Basic data access technologies, DAO and RDO.

Accessing Data Using Visual Basic

The figure below is a roadmap of data access technologies found in Visual Basic. The figure features "hot" zones, which can click to find out more information about any particular set of data, access tools or technologies.

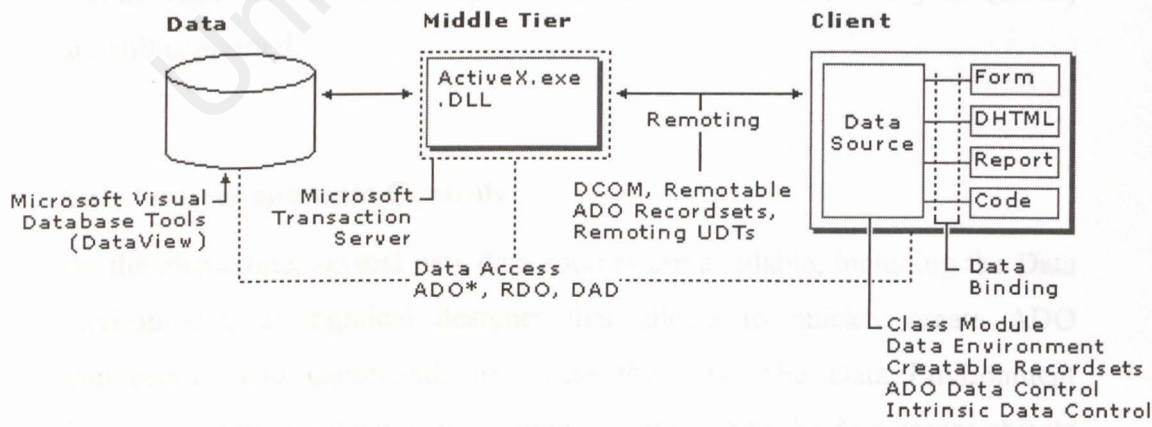


Figure 5.1 Database Access Control in Visual Basic 6.0

### Microsoft Visual Data Tools

Using Visual Basic 6.0, components that encapsulate every step in a data access system can be created. Beginning with the data source, Microsoft Visual Data Tools (accessible through the Data View window) give the ability to view and manipulate tables, views, stored procedures, and database schemas on SQL Server and Oracle systems.

### Middle Tier Components and Microsoft Transaction Server

The power of Visual Basic is also leveraged to create the middle tier components in application, as it makes its own ActiveX DLLs and EXEs. Visual Basic now includes enhancements that tailor applications to work with Microsoft Transaction Server.

### ActiveX Data Objects (ADO)

The bridge between the data providers and data consumers is through data sources created using Microsoft ActiveX Data Objects (ADO), which is the primary method in Visual Basic to access data in any data source, both relational and non-relational. For backward compatibility and project maintenance, Remote Data Objects (RDO) and Data Access Objects (DAO) are still supported.

### Data Sources and Data Controls

On the client side, several new data sources are available, including the Data Environment, a graphical designer that allows to quickly create ADO Connections and Commands to access the data. The Data Environment designer provides a dynamic programmatic interface to the data access objects in the project. In addition, the Data Environment provides advanced data shaping services — the ability to create hierarchies of related data, aggregates, and automatic groupings, all without code.



The new ADO Data control is similar to the intrinsic data control and Remote Data control, except that it uses ADO to access data. Now it can use an ADO Recordset as a data source for the controls and objects in Visual Basic.

In Visual Basic can create data sources either as user controls or classes, to encapsulate business rules or proprietary data structures. The class module now features the `DataSourceBehavior` property and the `GetDataMember` event, which allow configuring a class as a data source.

### Dynamic Data Binding

The ability to dynamically bind a data source to a data consumer is now possible in Visual Basic. At run time, now can set the `DataSource` property of a data consumer (such as the `DataGrid` control) to a data source (such as the ADO Data control). This capability, unavailable in previous versions of Visual Basic, allows creating applications, which can access a multitude of data sources.

### Presenting Data to the End User

Visual Basic offers a variety of rich ways to present data to end-users. ADO/OLE DB-based versions of all the data bound controls are included in Visual Basic:

- The `DataList` and `DataCombo` controls are the ADO/OLE DB equivalents of `DBList` and `DBCombo` controls.
- The `DataGrid` is the successor to `DBGrid`
- The `Chart` control is now data bound
- A new version of the `FlexGrid` control, called the `Hierarchical FlexGrid`, Support the hierarchical abilities of the Data Environment.
- The new `DataRepeater` control functions as a scrolling container of data bound user controls where each control views a single record.

The Data Report is a new ActiveX designer that creates reports from any data source, including the Data Environment. With the Data Report designer, formatted reports can be viewed online, printed, or exported to text or HTML pages.

### **Data Formatting and Data Validation**

The new DataFormat object allows to display data with custom formatting, but write it back to the database in the native format. For example, it can display dates in the format appropriate to a country, while the actual data is stored in a date format. Data is formatted coming out of the source, and unformatted going back in. It can also be done custom formatting and perform additional checks using the Format and Unformat events.

Data validation is also enhanced using the CausesValidation property with the Validate event. By setting the CausesValidation property to true, the Validate event for the previous control in the tab order will occur. Thus, by programming the Validate event can prevent a control from losing focus until the information it contains has been validated.

### **Language Features**

New data-related enhancements to the Visual Basic language include the ability to pass User-defined Types (UDTs) and arrays across processes. It can define a UDT and pass it as a parameter to another process, such as an ActiveX EXE or DLL.

### **DHTML and Data Access**

Visual Basic can create complete web applications for data access. All of the data tools and technologies can also be used in DHTML pages, and on web server (IIS) applications.

### **Data Access Tools in Visual Basic**

Introduces mechanisms (such as the Query Designer and Database Designer) and technologies (such as Format Objects) that make data access programming easier.



## About the Data Environment Designer

The Data Environment designer provides a means to easily access data in the Visual Basic project. In previous releases, they use the ActiveX UserConnection designer to create Remote Data Objects (RDO) at design time. Now, it can be created ADO objects at design time using the Data Environment designer.

## Writing Report with the Microsoft Data Report Designer

The Microsoft Data Report designer is a versatile data report generator that features the ability to create banded hierarchical reports. Used in conjunction with a data source such as the Data Environment designer, can create reports from several different relational tables.

## Data in a Microsoft Jet/Microsoft Data Access

Many data access applications created with earlier versions of Visual Basic store and manage data using the Microsoft Jet database engine, the engine used by Microsoft Access. These applications use Microsoft Data Access Objects (DAO) to access and manipulate data.

Now it can be used, Microsoft ActiveX Data Objects (ADO) to easily manipulate data in a variety of database formats, including Microsoft Jet format. DAO still can be used to work with local Microsoft Jet databases, but for new applications the developer will probably want to use ADO and the new data access features of Visual Basic.

## Create a DHTML Application that Interacts with SQL Server Data

Visual Basic lets easily to create applications that use the Internet or a corporate Intranet to interact with data in a distributed relational database system such as SQL Server. For example, an application that uses an HTML page for data entry or to query data in the database can also be created.

### **Data in an ASCII Test File**

The data, which is needed to interact with application, may not always be stored in a relational database. It may be stored in delimited or fixed-length fields in an ASCII text file. For example, the application's data source may be data downloaded into a text file from a mainframe computer, a file converted from an unsupported database format or operating system, or an "ad hoc" data file created with a text editor.

By creating a data-aware class and using Microsoft ActiveX Data Objects (ADO), use Visual Basic to create applications that interact with data in an ASCII text file. The application can read data from a text file, update fields, add new records, and write data back to the text file as if the data were stored in a relational database.

### **Using Data Access Objects with Remote Database**

- Data Access Objects (DAO) is an older database technology that can be used either with the standalone Microsoft Jet database engine, or with direct access to remote data sources through the new ODBCDirect option. This section discusses DAO functionality in both modes, emphasizing the special design considerations of large-scale client/server applications.

### **Using Remote Data Objects and the RemoteData Control**

- Remote Data Objects (RDO) is an older database technology that provides a direct Visual Basic interface to remote ODBC data sources, and the RemoteData Control (RDC) makes this functionality available in a simple user interface control. This chapter provides a thorough discussion of the RDO/RDC features and functionality in client/server applications.



## **5.4 CONCLUSION**

For the development of any system, software programming is very important. With the suitable software, appropriate system can be designed for appropriate types of jobs. Not all-programming languages are suitable for all types of systems. Some languages are suitable for database some are suitable for web based. But Ms VB6 can be used most of the Database programming in a very short period of time.

CHAPTER 6  
SYSTEM TESTING  
University of Malaya

## 6.1 DEFINITION

Before releasing any system, it must be tested in order to check whether they are working properly. When the system developer finds any error, they try to find the solutions in those particulars. First, find the error and then find the solution to be solved. In short system test ensures that application program written in isolation work properly when they are integrated into the total system.

Testing is very important in software development. It can prevent any problem to the user and developer. The types of testing are given below.

## 6.2 SYSTEM TESTING

System Testing  
Integration Testing

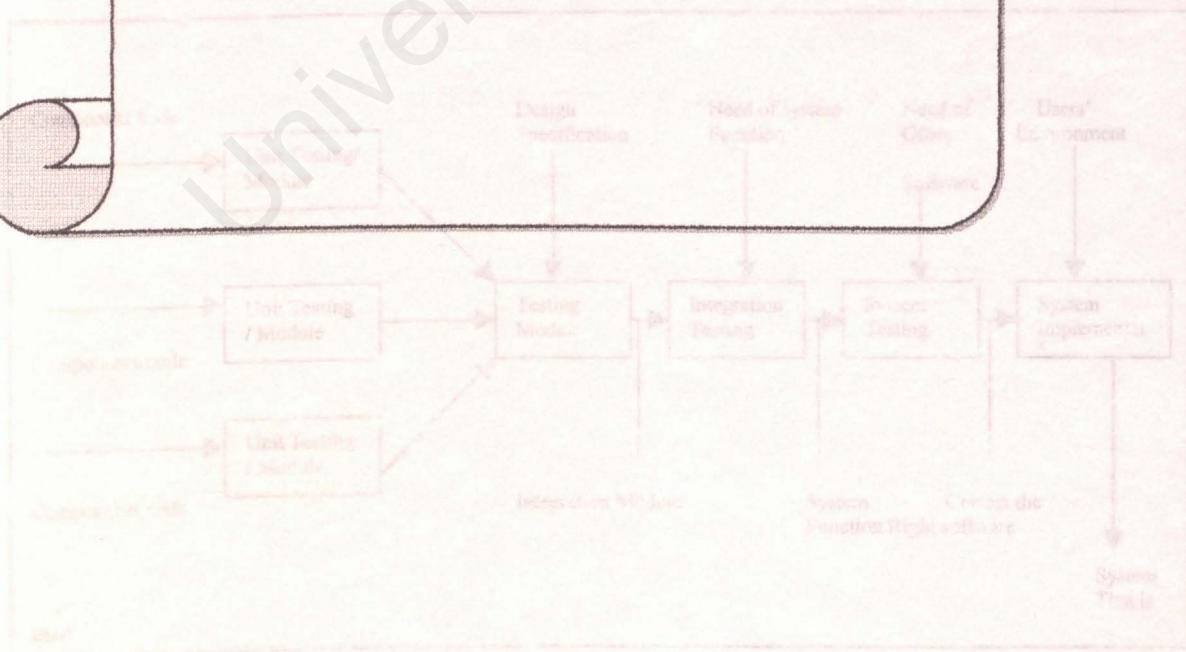


Figure 6.1 It explains the steps of testing ETS.



SYSTEM TESTING

6.1 DEFINITION

After designing any system, it must be tested in order to check whether there is error or working properly. When the system developer finds any error, they try to find the solutions of those particulars error, and find the causes of error also to be solved. In sort system test ensures that application program written in isolation work properly when they are integrated into the total system.

Testing is very important for detecting error that might cause problem to the user and developers. Testing the system can be done through a structural process. The types of testing are given bellow.

6.2 TYPE OF TESTING

- 1. Unit Testing
- 2. System Testing
- 3. Integration Testing

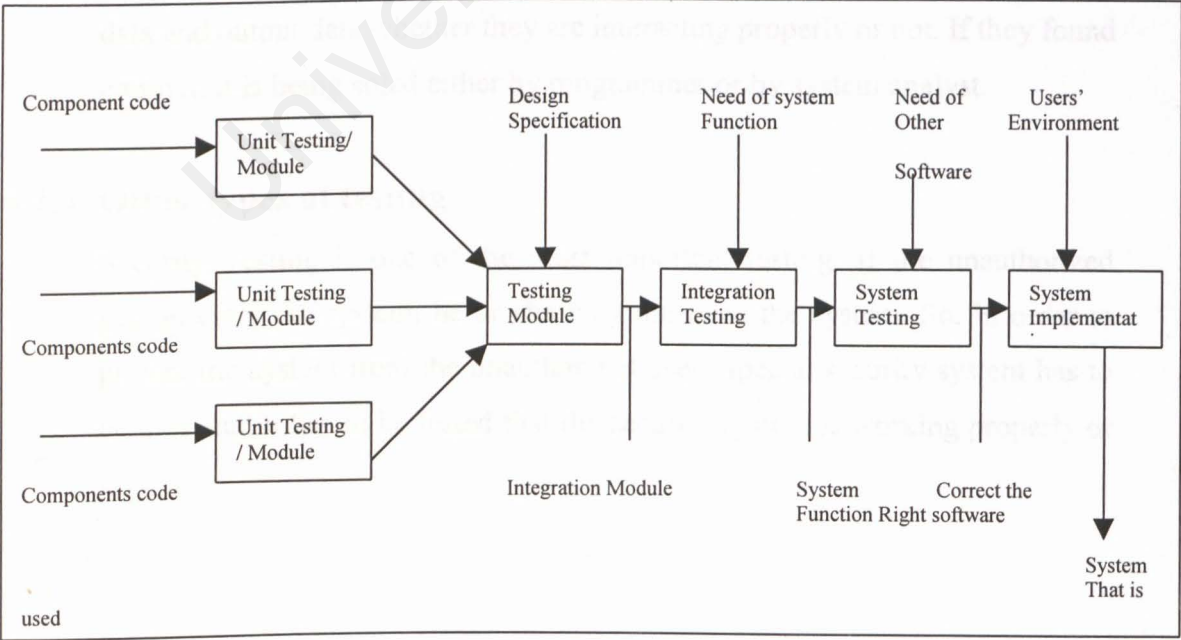


Figure 6.1 it explains the steps of testing ETS.

## 6.2.5 Testing the Users

### 6.2.1 Unit Testing

In this unit testing, functions of program and module are always observed. The first steps of testing are the Unit Testing. This testing is being done on every component of the programming and other applications. This testing is done during the development of the ETS. Every time, when a function is design. It is tested in order to check the error. If found error, the code is tested again and correct it until they are error free.

- a. In this testing, coding and algorithm and syntax are observed.

### 6.2.2 System Testing

After all the codes for all the questions have been done, they are tested again to make sure that the database linkage is working properly. If they found any error, they try to find the cause of error and fixed them until it run smoothly.

### 6.2.3 Integration testing

Integration testing is the proper communications testing between database and the module used in the ETS, in order to work properly. Testing for the input data and output data whether they are interacting properly or not. If they found conflict, it is being soled either by programmer or by system analyst.

### 6.2.4 Other types of testing

Security Testing is one of the most important testing. If the unauthorized person enter the system, he or she may miss use the system. So, in order to protect the system from the unauthorized user. Special security system has to be used and it has to be tested that the security system is working properly or not.



### **6.2.5 Testing the Users**

Testing the users is also one kind of error. In the case of ETS. To access the bank of questions, the students must be valid. The system must check the right students.

## **6.3 CONCLUSION**

Testing the system is very important before it has given to the users. If the system shows any kind of error, the programmer or system analysts must correct it. Testing or error correcting is very expensive and difficult jobs. When a system is completely tested and it has no error, then the system is given to the user or end-users to use.

## 7.1 SYSTEM EVALUATION

# CHAPTER 7

## SYSTEM

## EVALUATION

Figure 7.1 shows research estimates that the amount of time spent on system maintenance may be as much as 60% of the total time spent on systems projects.

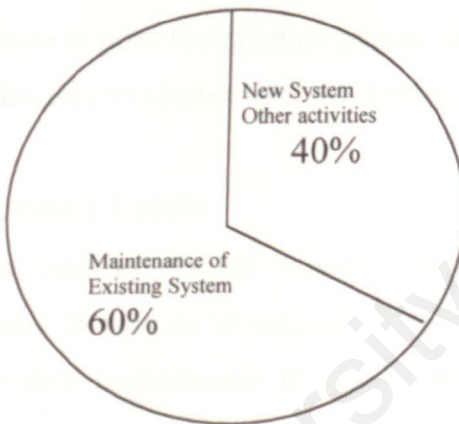
As a system is developed, there is a possibility that an analyst finishes one phase of system development and proceeds to the next, the discovery of a problem may force the analyst to return to the previous phase and modify the work done there. For example, during the testing phase, the programmer may discover that the program does not work correctly, either because code was not written to represent certain portions of the system design or the design was too complex. In either event, the program must be modified, and the analyst may have to change some of the system design material. In some cases, this process is called a "walk-back" because the analyst meets with the users and programmers have a second time activity function.



## SYSTEM EVALUATION

**7.1 SYSTEM EVALUATION**

Every system has their own value and advantage. But every developer's objective is to develop a system, which can be more useful to end-users. Evaluation is shown as part of this final phase of the System Development Life Cycle mostly for the shake of discussion. Actually Evaluation takes place during every phase. A key criterion that must be satisfied is whether the intended users are indeed using the system.



*Figure 7.1 some researcher estimate that the amount of time spent on system maintenance may be as much as 60% of the total time spent on systems projects.*

It should be noted that systems work is often cyclical. When an analyst finishes one phase of system development and proceeds to the next, the discovery of a problem may face the analyst to return to the previous phase and modify the work done there. For example, during the testing phase, the programmer may discover that the program does not work correctly, either because code was not written to support certain portions of the system design or the design was incomplete. In either event, the program must be modified, and the analyst may have to change some of the system design materials. In turn this may necessitate that the analysts meet with the users and reinvestigate how a specific business activity functions.

## 7.2 VALUE OF A ETS

System has a lot of advantages; such as if the modern business work is done under the computer management business system, their output and management of the overall activities will be done in a much better way. That's why business now a days are very much keen to understanding the E-Commerce, where they can communicate with other through internet or through their system, which save their valuable time.

Such as, ETS is the system, where institution can use it for testing their children, which cut down their variable cost very much. Such as, they don't have to print the question papers; they can save their time.

Security evaluates very much to the system as well as the function of ETS

## 7.3 CONCLUSION

In order to produce valuable system, all aspects of activities and functions need to take in to account. This is called as quality maintenance. Software quality maintenance is one of the most valuable activities that a system developer should be more alert.



In the process of any programming or software development is a problem, especially when designing new software or developing a new system.

There are many ways to solve this problem:

If we want to solve the problem, we can try to solve the problem, or we can consult with the expert in order to solve the problem.

8.1 Problem of

## **CHAPTER 8**

The problem I faced in this chapter is the problem of solving the problem and providing the questions in the chapter.

8.2

How problem

## **SYSTEM**

## **PROBLEM FACED**

**&**

## **SOLUTIONS**

CONCLUSION

In every development of system, the programmers or system analysts have to face the problem. At the same time they need to know how to solve the

problem. In this chapter, we will see the solution to solve their problem.

**PROBLEM FACED AND SOLUTIONS**

In the process of every production more or less there is a problem, especially when designing new software or develops a new system.

There must be some ways to solve this problem.

If we want to solve the problem, we call the expertise to solve the problem, or we consult with the expertise in order to solve the problem.


**8.1 Problem of ETS:**

The problem I faced in designing the ETS is creating the random questions and presenting the questions in the form of animations and interactive multimedia.

- 8.2 How problem of ETS is being solved.  
The problem of ETS is being solved by discussing with friends who are expert in this field.  
And discussing the supervisor, and reading a lot of books related to ETS, with much of example.
- 8.3 In order to avoid the problem, I think system developer should have vast knowledge of the program he is using and follow the Gantt chart to finish the task in time.

**8.2 CONCLUSION**

In every development of system, the programmers or system analysts have to face the problem. At the same time they need to know how to solve the problem. They need to discuss with much expertise in order to solve their problem.



## CHAPTER 9

## SYSTEM CONCLUSION

## BIBLIOGRAPHY

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**CONCLUSION****9.1 CONCLUSION (General Idea)**

The Electronic Testing System, “ETS” is the wonderful idea of testing system. It really save a valuable time and be accustomed with the latest technology. Now a days, people are very much reluctant to do the job in the traditional way, they like to save their time and lie to do their jobs in the interactive way, such as multimedia or animations or motions pictures.

ETS, if it is developed to the maximum capacity, it would work much wonderful job, to the institutions. That’s future enhancement should be taken to this ETS.

Due to limitation time, experience and skill I couldn’t designed this until to its extents that it should be.

Thank you.

**9.2 BIBLIOGRAPY**

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### 9.3 About the included CD-ROM

The whole soft copy of ETS is given in side the CD-ROM. The user manual is also given as a form of PDF. If you like to setup the ETS, follow the following steps:

1. D:\Etest\Setup.exe
2. Follow the instructions
3. Copy ets.mdb to D:\Etest\Ets.mdb
4. Finished

## Introduction

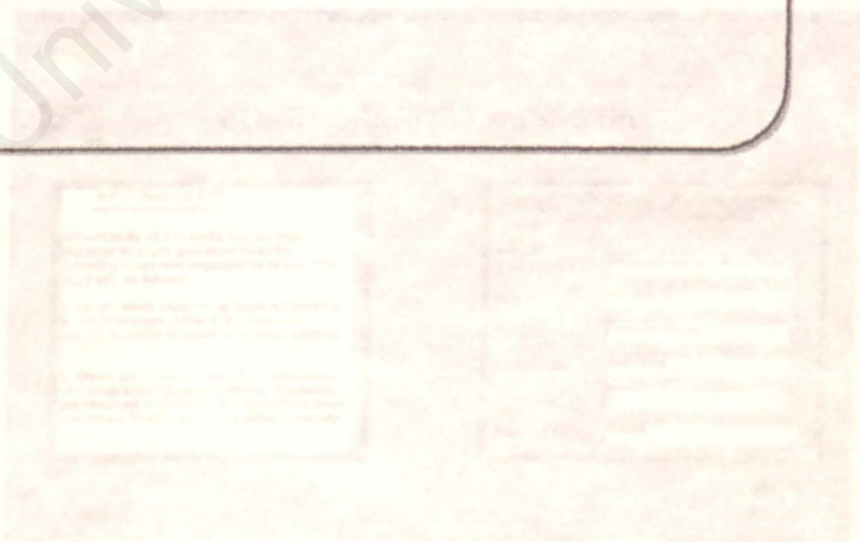
In these appendices, you will find all the information you need to use the system. This manual is for the user of the system. It is a reference manual.

Authorized user information: The user must have to log in their name and password to use the system.

# APPENDIX A

## USER MANUAL

After the authorized users have successfully logged on the system, they can see the main screen of the system. As the figure shows below:



The above figure is the main screen for the student to input their personal information.



## APPENDIX A

### Introduction

In these appendix sections, end-users can find the user manual that the end users will know how to use this system. In every system, there is a user manual, which is for the user to guide them how to use the design system graphically if possible.

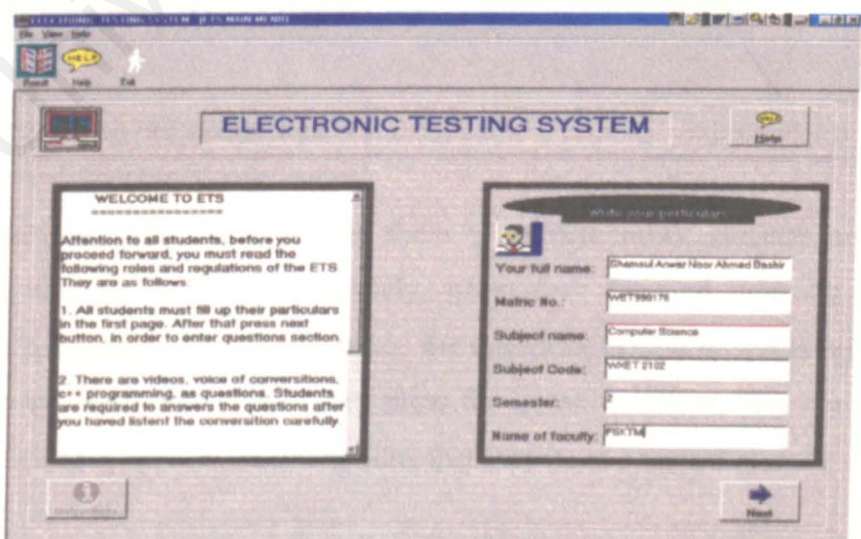
Authorized user will see is the, authorization screen, where the users have to key their name and authorization numbers (password.)



User name

Authorization number (password)

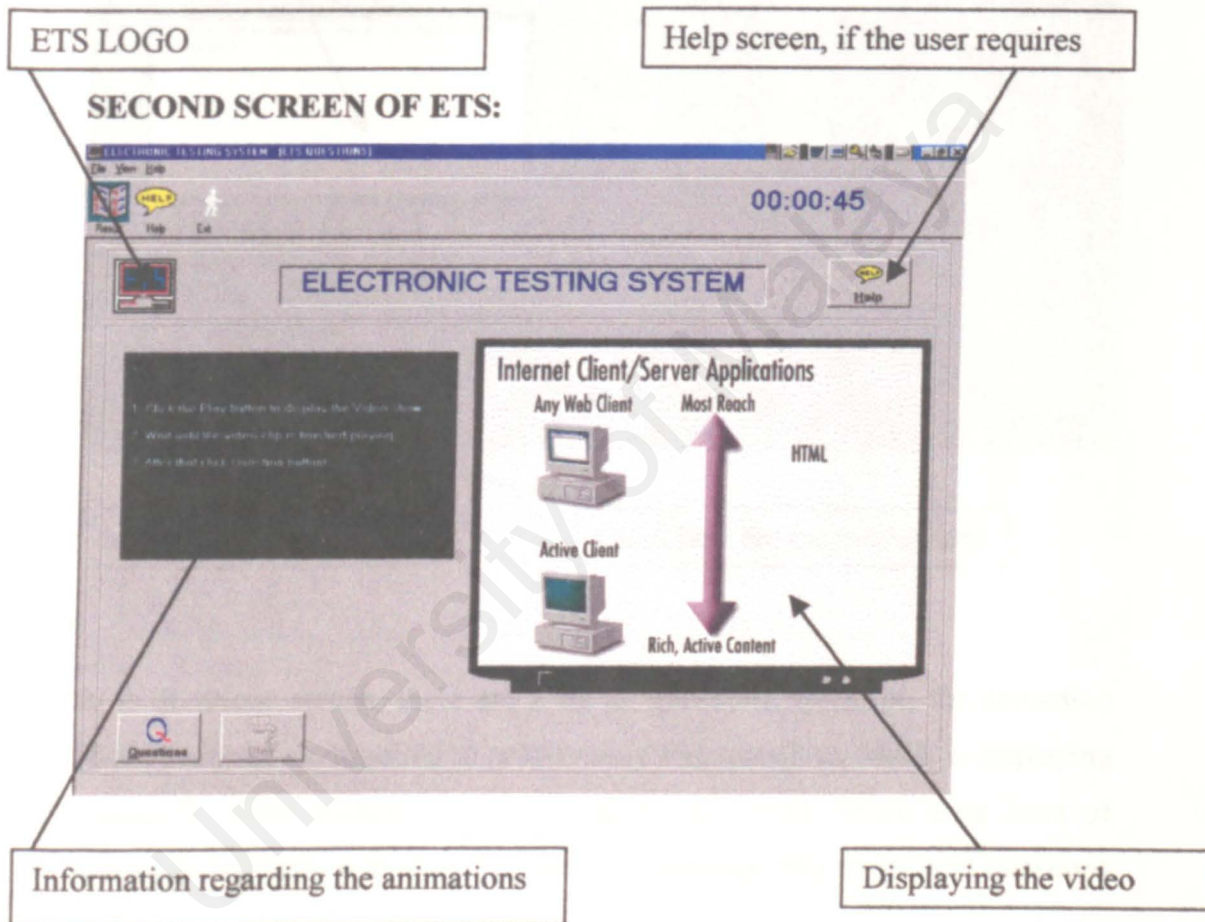
After the authorized users have successfully logged on the system, they can see the first screen or the main menu. As the figure shown bellow.



*The above screen is the main screen, for the student to input their personal information*

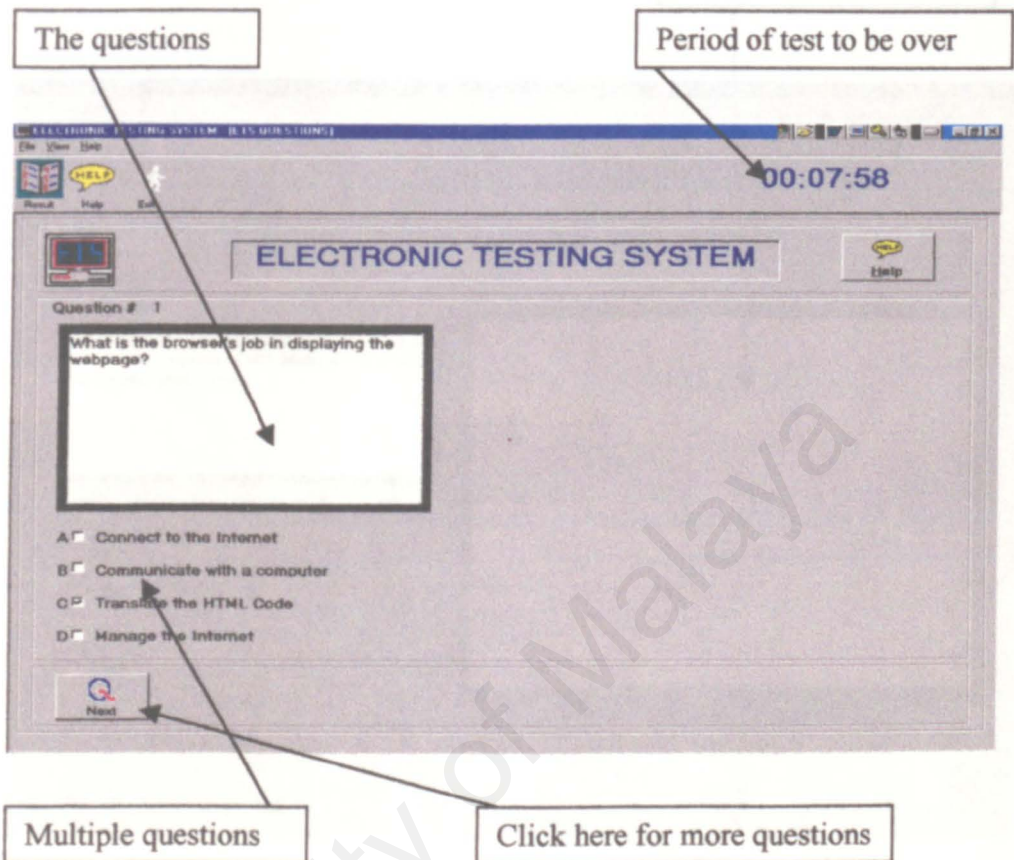
## THE THIRD SCREEN OF ETS

In the first screen that shown on the previous page, student has to enter their particulars, in the space provided for student's particulars, and there is a help button, in case of any help that a student can refer to in order to use the or what to do during examination is going on. After the student filled up all his / her particulars they should press next in order to enter our test questions area. The first questions area look like the one shown on this page.



This screen is actually for questions, there is a video shows, students are to listen and look to the videos carefully, when they finished listening this animations questions, they should press, the questions button which is on the left bottom of this screen. When they press the question button, they can see sets of questions related to the animations that they have watched already.

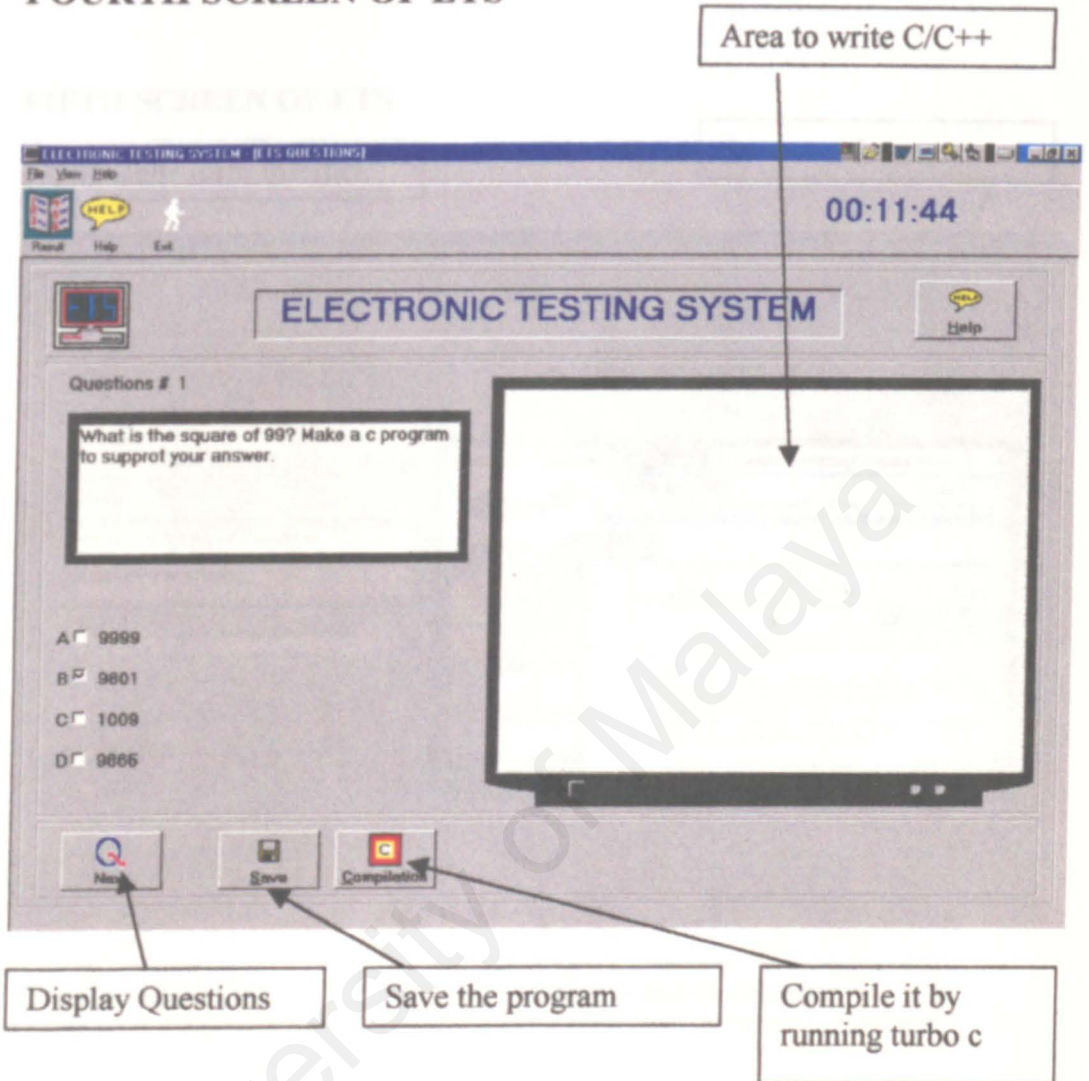
## THE THIRD SCREEN OF ETS



In this questions screen, there are a lot of questions, based on the animation show, students are required to answer only five questions which are displaying randomly. When a student presses the next questions button, when their limit of questions has been over they are asked by a message box to go to the next questions sections.

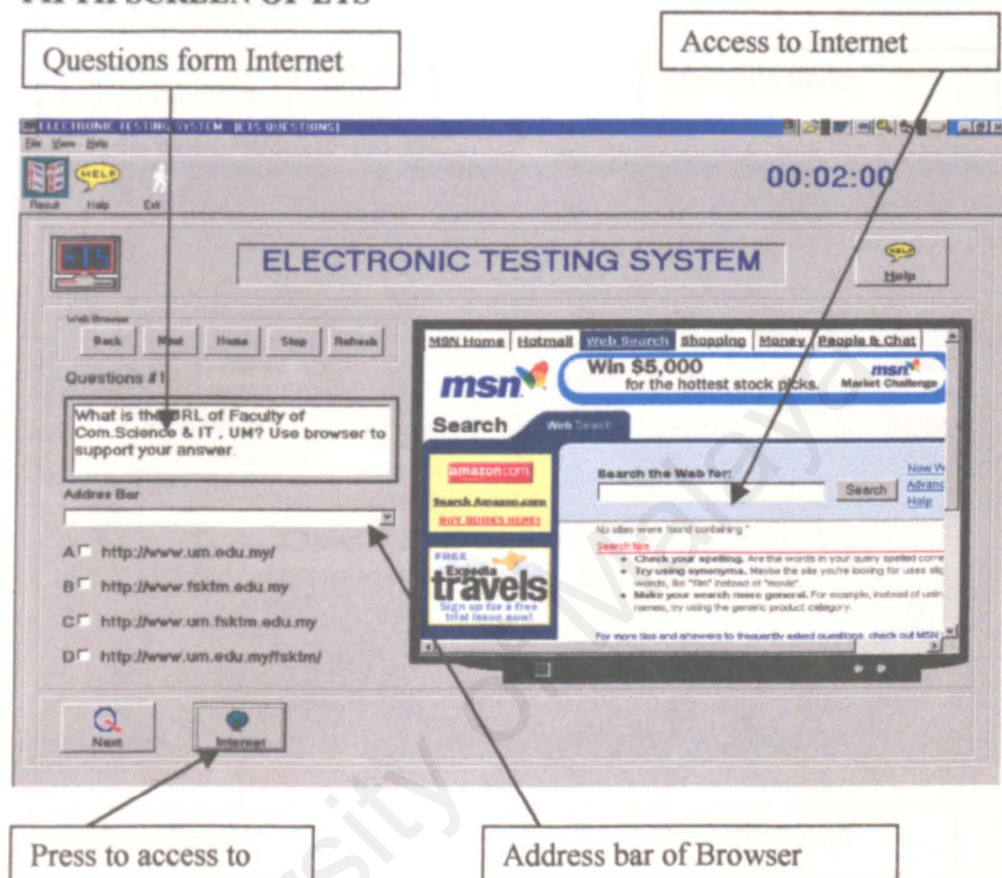


## FOURTH SCREEN OF ETS



Next questions sections is the set of questions related to c language, where students are asked to answer few answer that is given on that screen, with the support of c language, they have to write the program, of the questions and answer given on that page, and finally they have to write c program on the text area provided to their right side, and then they can save it by pressing the save button, after they may compile it by pressing the compile button, when they press the compile button, they are taken to the c language, where they can compile their written program and run the program, after they have got the output similar the one given in the questions, they can choose the right answer. This screen looks like as follows:

## FIFTH SCREEN OF ETS



The next question sections are to test the students the Internet knowledge. There students are asked such a questions where they have to access to Internet in order to be their right answer is true. Here is given a browser, and a address bar of the browser, student may type the URL that is asked to be sure whether it is right or wrong, when they access to internet, the text area to their right will work as the browser.

## OUTPUT SCREEN

The screenshot shows the 'ELECTRONIC TESTING SYSTEM' interface. At the top, a status bar displays '00:16:24'. The main window is titled 'ELECTRONIC TESTING SYSTEM'. On the left, under 'Student's Record', there is a 'Search' button and a text field containing 'WET990176'. Below this, fields for 'Metric ID', 'Name', 'Subject', 'Code', 'Semester', and 'Faculty' are filled with 'WET990176', 'Shamsul Anwar', 'Titas 2', 'To1', '2', and 'fsktn' respectively. At the bottom left are 'Previous', 'Next', and 'Exit' buttons. On the right, under 'Marks', a table shows the following data:

Marks	
Questions	8
Total Marks	10
Right Answers	2
Wrong Answers	4

At the bottom right is a 'Print the Result' button. Annotations with arrows point to various elements: 'Search the Student's record' points to the Search button; 'Student's Score' points to the 'Total Marks' field; 'Students Record' points to the 'Metric ID' field; and 'Print the Result' points to the 'Print the Result' button.

This is our last sections of the questions, when the students arrive here, and have answered all the questions, there will be a message box saying, no more questions, and all the questions are being answered.

Then student's record will be save to their database, later one the examiner can trace their Result, by clicking the view result on the toolbox at the top of the screen.

This is the screen, where the examiner can check student's result that he or she has done, in this ETS system.

This screen has the searching tools where their metric number shall search student's record, simply typing their metric number beside the text area of the search button.